MATADERO AND BARRON CREEKS

PLANNING STUDY

(Palo Alto Flood Basin to
Foothill Expressway)

consisting of

ENGINEER'S REPORT

and

FINAL NEGATIVE DECLARATION

APRIL 1988

Santa Clara Valley Water District

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SANTA CLARA VALLEY WATER DISTRICT

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SCH # 87122908

Engineer's Report Prepared by

Predesign Division

Keith W. Whitman, P. E.	Associate Civil Engineer
Shaikh E. Buksh	Assistant Civil Engineer
Randall R. Talley, P. E.	Division Engineer

Negative Declaration Prepared

under the direction of

Dr. Bernie Goldner — Environmental Specialist

Stan Wolfe, P. E.
Head, Project Development Branch

John T. O'Halloran
General Manager

Robert R. Smith
Flood Control Manager

APRIL 1988

DISTRICT BOARD OF DIRECTORS

Joe Pandit, Chairman	District 1	James J. Lenihan	District 5
Patrick J. Ferraro	District 2	Sig Sanchez	At Large
Robert W. Gross	District 3	Joe Judge, Vice Chairman	At Large
Joseph H. Donohue	District 4		

With Assistance From

Kathleen Martin	Junior Civil Engineer
Tom Iwamura	Engineering Geologist
Rich Kimmel	Assistant Engineering Geologist
Maria Lester	Engineering Technician
Rechelle Bravo	Engineering Aide

And Contributions to the Negative Declaration

By

Archeological Resource Management
San Jose, CA

and

Harvey and Stanley Associates
Alviso, CA

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MATADERO AND BARRON CREEKS PLANNING STUDY
Palo Alto, California

ABSTRACT

This document is the Final Planning Study Report on the Matadero and Barron Creeks proposed flood control project. Included is the Engineer's Report and Final Negative Declaration.

The draft report was circulated for a 45-day public review period that closed on January 28, 1988. A public hearing was held January 20, 1988 at Walter Hays Elementary School. Appendix O of this report contains copies of all letters of comment and the associated District responses. In response to some of the comments portions of this report have been expanded or revised.

The proposed flood control project consists of the replacement of nine bridges and 2,500 feet of concrete channel, addition of floodwalls along 8,000 feet of lower Matadero Creek, construction of a one-mile-long underground high flow bypass channel and a 2,000-foot-long underground diversion channel, and miscellaneous erosion repairs and access ramps in the upper reaches of Matadero Creek near Foothill Expressway. The project construction is estimated to cost $20.6 million and will be funded by existing revenue generated in the District's Northwest Flood Control Zone from flood control benefit assessment and the District's allocation of the 1% property tax.

PREFACE

In 1977, the Santa Clara Valley Water District initiated studies of the flood damage potential from Adobe, Matadero and Barron Creeks. When the Jarvis-Gann Initiative (Proposition 13) passed in 1978, however, these studies were suspended because of a reduction in flood control revenues and the inability to fund construction of flood control projects.

In 1982 the District's Flood Control Benefit Assessment Program was approved by voters and, with revenue for construction increased, the District reopened the Adobe Creek Planning Study. A plan (Measure F) to increase benefit assessment rates and accelerate the flood control construction program was approved by voters in the Northwest Zone in November 1986. Matadero Creek is a high priority flood problem in the District's Northwest Flood Control Zone, following the Palo Alto Flood Basin and Adobe Creek. Barron Creek follows Matadero in priority and has been included in this study because of the possibility of a joint flood control solution.

The flood basin project and the first phase of the Adobe Creek project were constructed in 1986. The remaining construction phases of the Adobe Creek project (downstream of El Camino Real) will be staged over the next two years.

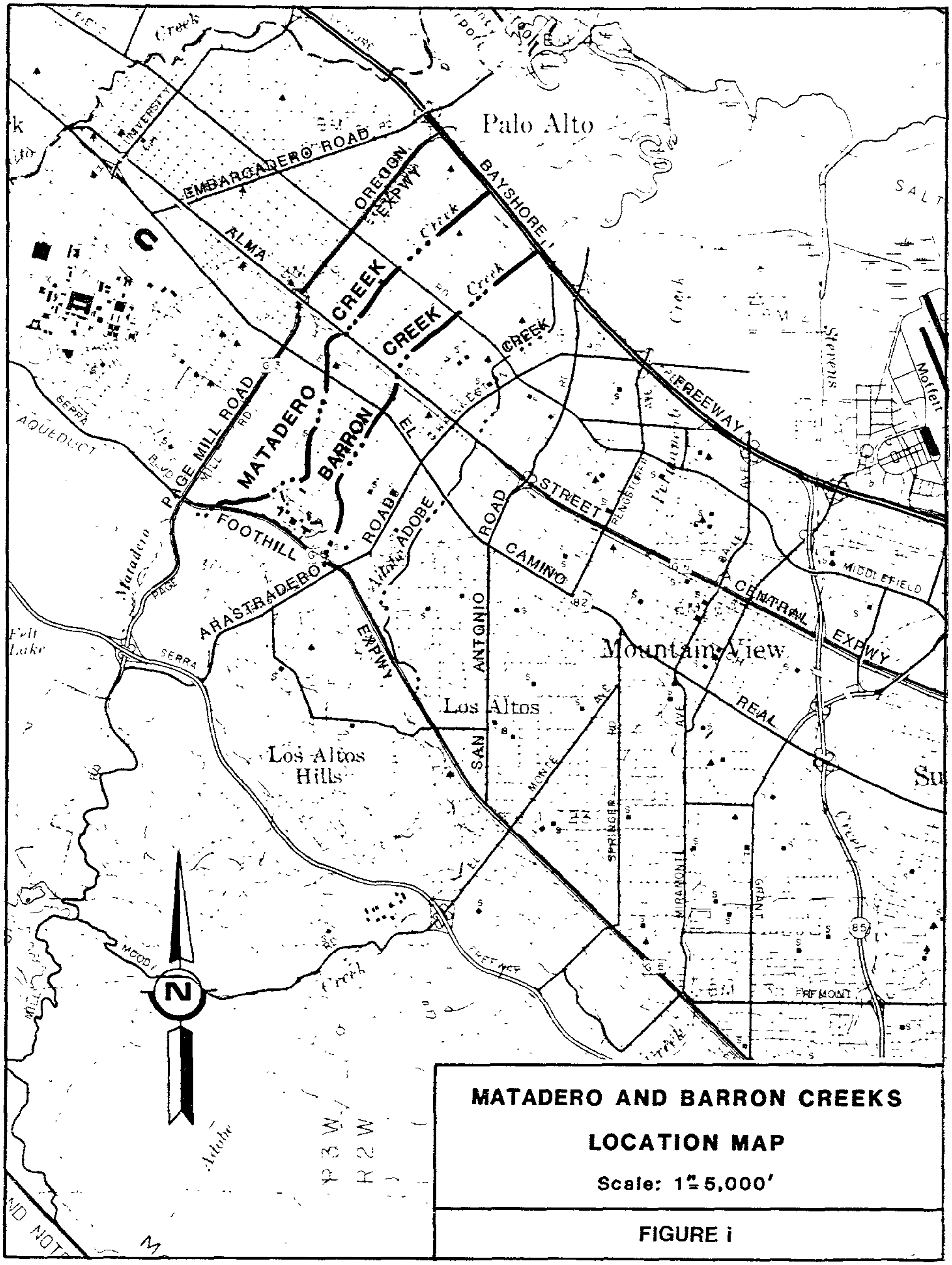
This Planning Study for Matadero and Barron Creeks is the first step toward solution of the flood problem on those creeks and represents an important element of an areawide solution toward reducing the flood damage potential.

The Matadero Creek study area extends from the Palo Alto Flood Basin upstream to Foothill Expressway, a distance of about four miles. The characteristics of the creek vary from a brackish marsh near the flood basin, a concrete channel between Greer Road and El Camino Real, to a mostly natural stream channel upstream of El Camino Real. The upstream portion of the stream is actively eroding and many stream bank repairs have been made. Downstream is very flat and has experienced land subsidence which has aggravated backwater, sedimentation and local drainage problems.

The Barron Creek study area extends from Louis Road upstream to Foothill Expressway. The reach of Barron Creek between its Adobe Creek confluence and Louis Road was included in the 1985 Adobe Creek Planning Study. The lower reaches of Barron Creek are concrete-lined while the upper portions consist of a combination of underground pipe and natural channel. Barron Creek is inadequate to carry the one percent peak flow rate for its entire length but the most critical area is near Laguna Avenue where it enters an underground pipe.

This report presents an explanation of the flooding and erosion problems and recommends a project and long-term maintenance program designed to solve these problems. Matadero Creek is the focus of this study while Barron Creek has been included only within the context of a joint flood control project that will solve flooding problems on both creeks. The proposed project has been designed to safely carry the one-percent (100-year) flood while minimizing construction costs and overall disruption to the community and the natural environment. The proposed project is estimated to cost $21 million and will be funded with benefit assessment and property tax revenues generated in the Northwest Flood Control Zone. The project consists of channel modifications and replacement of bridges downstream of El Camino Real, an underground high flow bypass channel between Bol Park and El Camino Real, selective channel enlargement and bank stabilization upstream of Bol Park, and an underground diversion channel from Barron Creek to Matadero Creek.

The summary that follows is a concise overview of this report. Those readers interested in greater detail should read the remaining portion of the report and refer to the Appendices.



MATADERO AND BARRON CREEKS

LOCATION MAP

Scale: 1" = 5,000'

FIGURE i

SUMMARY

Overview of Study

In this report, the flood damage potential and other problems are fully examined and a range of alternative solutions are discussed. A detailed analysis of doing nothing ("No Project") is provided and a recommended project is described.

Public hearings will be held on the Engineers' Report and environmental document, comments will be solicited from the community and responsible agencies. The District Board of Directors will then decide what action, if any, to take.

District Planning Goals and Objectives

It is the objective of the Santa Clara Valley Water District to reduce flood damages in Santa Clara County. The County is divided into five flood control zones. Each zone is defined by watershed boundaries and is essentially a unique fiscal entity. All revenue generated within a zone must be spent on the construction, operation, and maintenance of flood control facilities in the same zone.

Flood problems are first investigated in a long-range planning context. The flood damage reduction needs are identified, assessed, and given a priority ranking on a project by project basis within each zone. The criteria used to determine the ranking include many factors but are most heavily weighted toward projects that will prevent the greatest potential flood damage.

After the project study area has been defined, the problems are investigated in a greater level of detail. History and background are also researched and a variety of alternatives, including the impacts of doing nothing are explored. The District has developed an integrated project planning process that includes evaluation of flood damage reduction, erosion, sedimentation, maintenance, and other concerns. All project alternatives are evaluated within the context of economic feasibility, environmental impact and mitigation, and community acceptability.

It is the policy of the Santa Clara Valley Water District to design flood control projects to safely convey the one percent flood with appropriate freeboard. Freeboard requirements are consistent with standards set by the Federal Emergency Management Agency (FEMA), the federal agency responsible for the administration of the National Flood Insurance Program (NFIP), and are described in the Design Criteria Section of this report. The one percent flood is discussed in Appendix A and is also a standard level of protection set by FEMA.

It is a requirement of the NFIP that flood insurance be purchased when financing, through federally backed institutions, structures located within a designated flood hazard area. (The National Flood Insurance Program is described in Appendix I.) It is also a goal of the Santa Clara Valley Water District to reduce the public's financial burden of mandatory flood insurance by providing flood protection.

Background

Matadero and Barron Creeks are located in the District's Northwest Flood Control Zone. Their headwaters originate in the Santa Cruz Mountains, west of Palo Alto, and flow easterly to San Francisco Bay. Two tributaries join Matadero Creek on its way to the Bay. Arastradero Creek combines with Matadero upstream of I-280 near Arastradero Road and Deer Creek joins Matadero Creek just upstream of Foothill Expressway. Barron Creek drains a small urbanized watershed originating in Los Altos Hills.

Following the flood of December 1955, the City of Palo Alto contracted with the consulting engineering firm of George S. Nolte to study the flood problems of Matadero Creek along with those of Adobe and Barron Creeks and the Palo Alto Flood Basin. In 1957, following recommendations of the Nolte report (2), the Matadero Creek Channel was enlarged and lined with concrete between Greer Road and El Camino Real. However, the existing culverts at street crossings were not replaced at that time and are presently the most serious cause of flooding.

The District completed a report (4) in 1964 that emphasized the fact that land subsidence, due to groundwater overdraft pumping, had aggravated local drainage problems and decreased the effectiveness of flood control works that were built in 1957. Recommendations of the 1964 report included increasing the height of the levees in the flood basin and in the downstream portions of the three tributary creeks: Matadero, Barron and Adobe.

A report (1) was prepared by the District in December 1976 that presented results of an investigation of Matadero Creek between El Camino Real and the Veterans Hospital. Both flooding and erosion problems were studied and a series of community workshops were held to discuss the alternative plans. The community strongly supported a bypass channel concept but it was not constructed because of limited revenue and a high construction cost. The measures implemented at that time consisted of enlarging the Matadero Avenue's culvert and various erosion repairs and were acknowledged as not providing protection from the one percent flood.

This current planning study investigates all creek-related problems between the Palo Alto Flood Basin and Foothill Expressway. The study is underway because Matadero Creek does not have capacity to safely convey the one percent flood and is the highest priority flood problem in the District's Northwest Flood Control Zone.

Problem Definition

The most serious problem of Matadero and Barron Creeks is the magnitude of the potential flood damages. About 4,300 existing structures would be impacted by a single one percent flood on Matadero and Barron Creeks, resulting in over $28 million in damages. Single family homes would account for most of the damage. Over the long-term, average annual flood damages of about $1.2 million per year could be expected. There are four sources of flooding in the study area; floodwaters from Matadero, Barron, and San Francisquito Creeks and saltwater flooding in the event of high tides and subsequent bayfront levee failure around San Francisco Bay.

Nearly all of the bridges and culverts along both Matadero and Barron Creek are inadequate to pass the one percent flood without overbanking. Most of these culverts were built in the 1930s and 1940s and were not enlarged with the channel in 1958.

Above El Camino Real, the Matadero stream channel is mostly natural except for the erosion repair works that have been constructed at various locations. Erosion of the stream channel is a serious problem and can threaten adjacent properties and public facilities. Eroded bank material and debris tends to be transported downstream, deposit in the channel and further decrease the flow carrying capacity.

Because the channel is actively eroding in the upstream reaches and sediment is depositing in the downstream reaches, maintenance is a serious, ongoing concern. Upstream of El Camino Real, Matadero Creek has few access points to the channel and the District does not own continuous right of way. As a result, maintenance operations are difficult and costly. Based upon recent expenditures, average annual maintenance costs for Matadero Creek are $65,000 per year and $50,000 per year for Barron Creek. These amounts do not include the natural channel of Matadero Creek between Hillview Avenue and Foothill Expressway or Barron Creek between Laguna Avenue and Gunn High School where the District does not presently have any existing right of way or maintenance responsibility.

Alternative Solutions

Several conceptual alternative solutions to the flooding and erosion problems have been investigated for Matadero Creek and are summarized in Table I. A more detailed evaluation of alternatives is provided in the Alternative Formulation chapter of this report.

TABLE 1
MATADERO & BARRON CREEKS PLANNING STUDY
OVERALL COST SUMMARY OF FEASIBLE ALTERNATIVES

MAT.AltsTable

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
(1) BARRON CREEK				
(A) Description	Floodwall Addition w/ Bridge Replacement	Floodwall Addition w/ Bridge Replacement	Diversion Channel	Diversion Channel
(B) Cost	$10.0 million	$10.0 million	$3.5 million *	$3.5 million *
(2) MATADERO CREEK			* Includes $1M for work on Matadero	* Includes $1M for work on Matadero
(A) Description	Floodwall Addition, Bridge & Channel Replacement downstream *El Camino* ($9.4M); Excavated Earth Channel upstream El *Camino* ($9.2M); Misc work upstream of Bol Park ($1M).	Floodwall Addition, Bridge & Channel Replacement downstream *El Camino* ($9.4M); Underground Bypass Channel upstream El *Camino* ($6.5M); Misc work upstream of Bol Park ($1M).	Floodwall Addition, Bridge & Channel Replacement downstream *El Camino*($9.4M); Excavated Earth Channel upstream El Camino ($9.2M); Misc work upstream of Bol Park ($1M).	Floodwall Addition, Bridge & Channel Replacement downstream *El Camino* ($9.6M); Underground Bypass Channel upstream El Camino ($6.5); Misc work upstream of Bol Park ($1M).
(B) Cost	$19.6 million	$16.9 million	$19.6 million	$16.9 million
(3) TOTAL PROJECT COST	$29.6 MILLION	$26.9 MILLION	$23.1 MILLION	$20.6 MILLION
(4) NARRATIVE	Matadero and Barron Creek flood problems *solved separately.* Greatest impact to the community of all alternatives. Traffic disruption on Los Robles Ave. Nearly 60 homes directly impacted along creek upstream of El Camino; seven hones removed. About 3.5 acres of riparian habitat permanently removed. *Substantial off-site* mitigation and land purchase required.	Matadero and Barron Creek flood problems *solved separately.* Substantial impact to traffic and the community. Traffic disruption on Los Robles Ave. About 40 homes adjacent to the Stanford channel R/W temporarily affected during construction of the Bypass channel. About 0.8 acres of partly vegetated land in Stanford Channel R/W impacted. On-site mitigation possible.	Matadero and Barron Creek flood problems solved jointly. Moderate impact to traffic, the community and the natural environment. Nearly 60 homes directly impacted along creek upstream of El Camino; seven homes removed. About 3.5 acres of riparian habitat removed. Substantial off-site mitigation and land purchase required.	Matadero and Barron Creek flood problems solved jointly. Lowest overall impact to traffic, the community and the natural environment of all alternatives. About 40 homes adjacent to the Stanford channel R/W temporarily affected during construction of the Bypass channel. About 0.8 acres of partly vegetated land in Stanford Channel R/W impacted. On-site mitigation possible.

TABLE 1
MATADERO & BARRON CREEKS PLANNING STUDY
OVERALL COST SUMMARY OF FEASIBLE ALTERNATIVES

MAT.AltsTable

	ALTERNATIVE 5	ALTERNATIVE 6
(1) BARRON CREEK		
(A) Description	Floodwall Addition w/ Bridge Replacement	Diversion Channel
(B) Cost	$10.0 million	$3.5 million *
		* Includes $1M for work on Matadero
(2) MATADERO CREEK		
(A) Description	Floodwall Addition, Bridge & Channel Replacement downstream El Camino ($9.4); Floodwalls W/ Channel Clearing upstream El Camino ($6.7M); Misc work upstream Bol Park ($1.0M).	Floodwall Addition, Bridge & Channel Replacement downstream El Camino ($9.4M); Floodwalls W/ Channel Clearing upstream El Camino ($6.7M); Misc work upstream Bol Park ($1.0M).
(B) Cost		
(3) TOTAL PROJECT COST	$17.1 million	$17.1 million
	$27.1 MILLION =============	$20.6 MILLION ============
(4) NARRATIVE	Matadero and Barron Creek flood problems solved separately. Greatest impact to the community of all alternatives except #1. Traffic disruption on Los Robles Ave. Nearly 60 homes directly impacted by floodwall along creek upstream of El Camino. About 2.5 acres of riparian habitat permanently removed. Substantial off-site mitigation and land purchase required.	Matadero and Barron Creek flood problems solved jointly. Nearly 60 homes directly and permanently impacted by floodwall along creek upstream of El Camino. Avg of 10 ft of backyards impacted. Severe local drainage and access problems w/ floodwalls. About 2.5 acres of riparian habitat permanently removed. Substantial off-site mitigation and land purchase required.

Alternatives investigated include upstream reservoirs, floodplain acquisition, various types of channel modification, underground bypass channels, and diversion channels. Upstream reservoirs and floodplain acquisition were eliminated because of the severe social impact and excessive costs.

The proposed project (Alternative 4 in Table 1) was selected because it provides one percent flood protection while minimizing construction costs and overall impact to the community and natural environment. The project is a combination of channel modification, bridge replacement, a high flow underground bypass channel, and a high flow underground diversion channel.

Proposed Project

A proposed plan for flood control on both Matadero and Barron Creeks is presented in this Engineer's Report. The project consists of adding floodwalls to the existing concrete lined channel and replacing the bridges between Bayshore Freeway and Alma Street. *The existing Alma Street bridge will remain and a new channel alignment* will be constructed between Alma Street and Park Boulevard. Between Park Boulevard and El Camino Real the existing trapezoidal channel will be replaced with a larger 25-foot wide rectangular concrete channel.

Upstream of El Camino Real, a high flow underground bypass channel is proposed. *The bypass channel has been designed to allow the existing natural channel to* remain undisturbed. High flows would enter the underground bypass near the old railroad bridge at the upstream end of Bol Park. Flood flows would be conveyed through the bypass and would combine with Matadero Creek flows at the downstream side of El Camino Real. Low flows would be carried by the natural creek.

There is an existing 700-foot long underground culvert below the Watkins-Johnson site downstream of Hillview Avenue. This culvert is inadequate to carry the one percent peak flow rate and a parallel culvert is proposed. At the outlet of the culvert, there is an existing stilling basin to which a proposed maintenance access ramp will be constructed.

Between Hillview Avenue and Foothill Expressway, the Matadero Creek channel is severely eroded and meandering. There are only a few local flooding problems so the proposed measures consist of minor channel enlargement at specific locations, repair of eroded banks and right of way acquisition.

To provide one percent flood capacity on Barron Creek, a high flow underground diversion channel is proposed. The proposed underground diversion would take high flows from the existing Barron Creek sediment basin near Gunn High School and carry them across Matadero Creek and into Matadero Bypass. Proposed downstream improvements in the Matadero Creek system have been designed to handle the additional peak flow from Barron Creek. Flows greater than the one percent on Barron Creek would not enter the Matadero system but would continue downstream into the Barron Creek system via an overflow spillway from the sediment basin.

Public Involvement

During the course of the planning study, District staff have met with various residents, business owners, the Barron Park Association, Stanford University, the City of Palo Alto staff and other public agencies. Community meetings were held May 27 and June 9, 1987 at which the background, problems, alternative solutions, and the proposed project were described. The meeting of May 27 focused on the study area downstream of El Camino Real while the meeting of June 9 covered the upstream area. A total of over 160 people attended these two meetings. Nearly 80 people filled out and turned in the evaluation forms provided at the meetings by the District. Letters of comment and two petitions were received following the public meetings. At the request of the Barron Park Assocation, an additional meeting was held September 14 to discuss, in greater detail, the alternative flood control solutions between El Camino Real and Bol Park.

The majority of written comments received (71 out of 80) at the two public meetings indicated support for the project. The petitions received regarded concern about impacts and disruption due to construction of the proposed bypass channel along the District's existing 50-foot wide Stanford Channel right of way. In response to these concerns the District met with staff of Varian and Stanford to develop a modified bypass channel alignment. Where feasible, the proposed underground bypass channel was relocated into the Varian parking lot rather than within the District's existing Stanford Channel right of way. An easement will be needed from Standord University to construct the realigned bypass. The easement will need to be approved by Stanford with the consent of Varian.

A public hearing was held January 20, 1988 to accept comments and questions on the proposed flood control project. A 45-day public review period was provided and ended on January 28, 1988. Verbal testimony was given by 25 people at the public hearing and 22 letters of comment were received. Copies of the letters of comment and District responses are contained in Appendix O.

Project Cost and Financing

The proposed project is estimated to cost approximately $21 million. The project would be funded using existing sources of revenue generated in the Northwest Flood Control Zone. These sources include the District's allocation of the 1% property tax and flood control benefit assessment. Reach by reach costs and proposed measures are summarized in Table 2.

Construction Staging

Because of constraints on the logistics of construction, the project must be staged over a period of several years. One of the primary concerns is the possible impact and disruption to traffic, utilities and the community. Roads at Greer, Louis, Ross, Cowper, Waverly, and Lambert may temporarily be closed during construction of the new bridges to expedite the replacement. If road closure during construction proves to be infeasible because of community objection or other reasons, a staged bridge replacement with detours will be used as is proposed for the larger bridge sites.

TABLE 2

MATADERO AND BARRON CREEKS PROJECT COSTS

Reach	Limits	Right of Way	Construction Cost	Total Cost*
1	Flood Basin to Bayshore Fwy.	$ 0	$ 0	$ 0
2	Bayshore Fwy. to Greer Road	$ 0	$ 90,000	$ 468,000
3	Greer Road to Cowper Ave.	$ 0	$ 2,750,000	$ 3,300,000
4	Cowper Avenue to Alma Street	$ 0	$ 1,177,000	$ 1,412,400
5	Alma Street to Park Blvd.	$ 100	$ 1,532,000	$ 1,838,500
6	Park Blvd. to El Camino Real	$ 0	$ 2,116,000	$ 2,539,200
7,8,9	El Camino Real to Bol Park	$ 60	$ 37,000	$ 75,060
Bypass	El Camino Real to Bol Park	$ 230	$ 5,575,000	$ 6,690,230
10	Bol Park to Hillview Avenue	$ 350	$ 950,000	$ 1,140,350
11	Hillview Ave. to Foothill Exp.	$ 480	$ 850,000	$ 1,020,480
Diversion	Sediment Basin to Matadero Cr.	$ 50	$ 1,838,000	$ 2,205,650
Barron Cr.	Laguna Avenue to Sediment Basin	$ 100	$ 0	$ 100
	Project Totals	$1,370	$17,215,000	$20,689,970

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* Total project cost includes construction, engineering, inspection, right of way and administration. (February 1988)

Construction will begin at the downstream end and progress upstream. It is estimated the construction will begin in the summer of 1988 and will be completed in 1993.

STUDY BACKGROUND INFORMATION

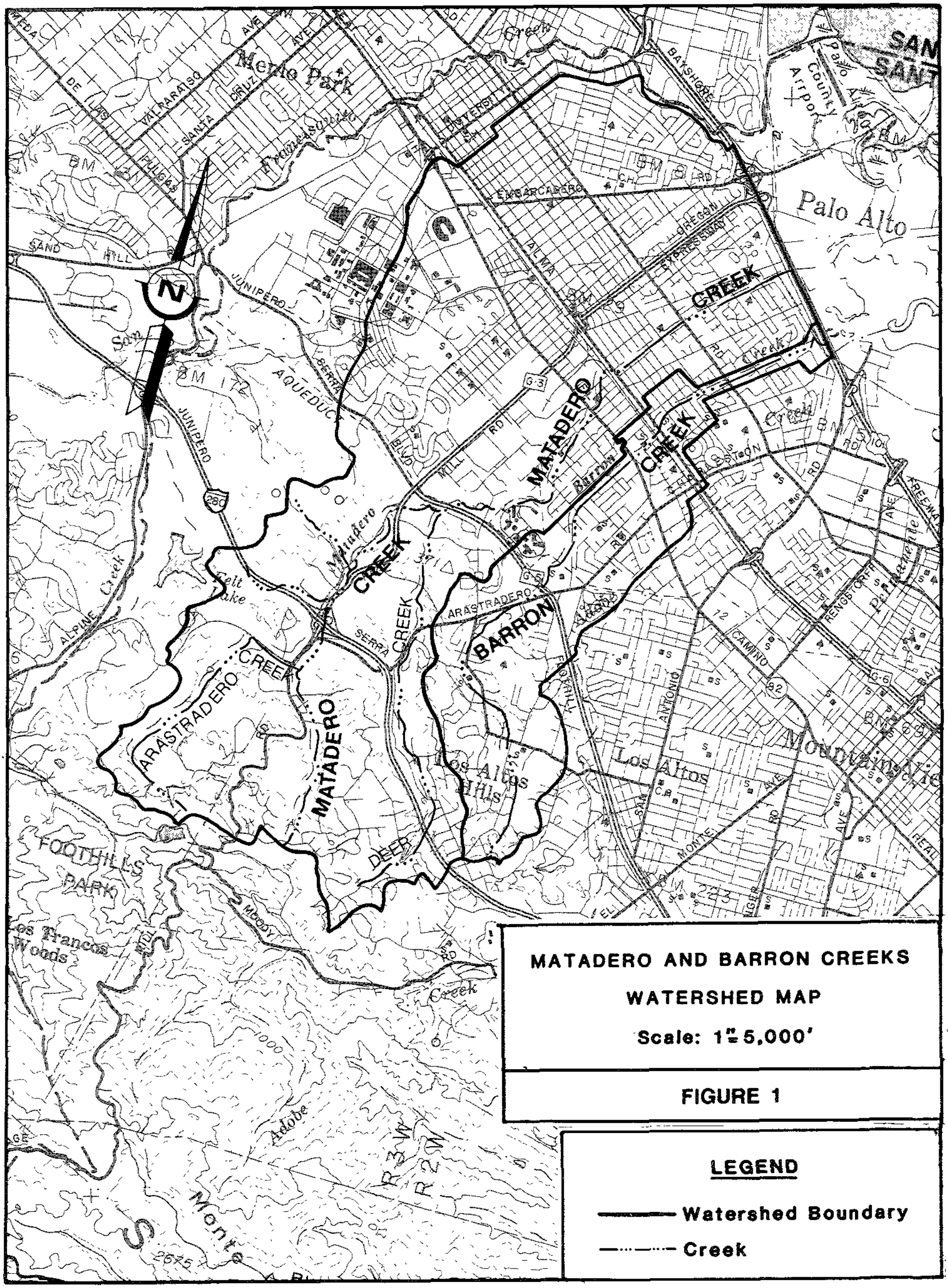
This chapter of the report provides a history of Matadero Creek. Topics covered included the watershed, the study area, previous studies, projects already constructed along the creek, geologic and hydrogeologic descriptions of the study area, historic stream channel, and land subsidence.

Matadero Creek Watershed

Matadero Creek is located in the District's Northwest Flood Control Zone. The creek originates near the Town of Los Altos Hills and flows in a northerly direction through the residential, commercial and industrial areas of the City of Palo Alto and some of the unincorporated areas of Santa Clara County. Downstream of Bayshore Freeway, it discharges into the Palo Alto Flood Basin, which outfalls into San Francisco Bay. Matadero Creek has a total watershed area of about 13.6 square miles of which 10.6 square miles is mountainous land and three square miles is gently sloping valley floor. The watershed is depicted in Figure 1.

Prior to the turn of the century, Matadero Creek was a well defined channel that meandered down a gently sloping alluvial fan of the eastern side of the Santa Cruz Mountains. The stream channel lost definition downstream of Southern Pacific Railroad (SPRR) as the land surface flattened out. Historic streamflows seemed to have spread out as shallow overland flow in a broad floodplain that stretched easterly toward the baylands. Periodic overland flows eventually made their way to San Francisco Bay.

By the turn of the century, much of the tidal marshlands of San Francisco Bay had been enclosed behind the levees of a host of small salt producing companies. Following World War I, Leslie Salt Company became the dominating concern. Construction of salt ponds eliminated much of the original broad floodplain and forced the use of outfall channels to carry freshwater streamflow to the Bay.



LEGEND

Watershed Boundary

Creek

MATADERO AND BARRON CREEKS WATERSHED MAP

Scale: 1"= 5,000'

FIGURE 1

In the late 1930s, the City of Palo Alto purchased land from Leslie Salt Company for what is today known as the Palo Alto Flood Basin. In the early 1940s the City made various modifications to the flood basin and enlarged the most downstream portion of the present day Matadero Creek channel.

Barron Creek Watershed

Barron Creek is also located in the District's Northwest Flood Control Zone. The creek originates in the residential areas of Los Altos Hills west of Interstate 280. The creek flows in a northeasterly direction through the City of Palo Alto and eventually combines with Adobe Creek just upstream of Bayshore Freeway.

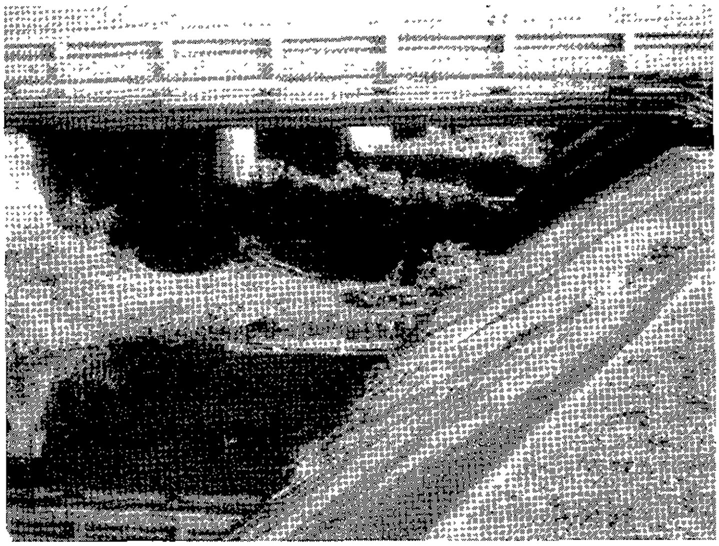
Barron Creek is primarily an urban watershed with a drainage area of about three square miles. Many modifications to the creek were made in the late 1950s.

The Study Area

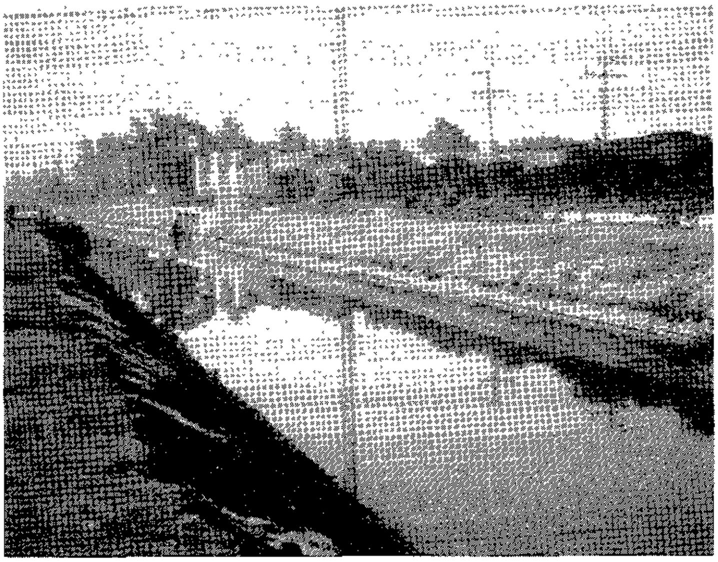
The Matadero Creek study area extends from the Palo Alto Flood Basin upstream to Foothill Expressway. In this area the creek flows entirely within the limits of the City of Palo Alto.

The reaches extending from Bayshore Freeway to El Camino Real and from the Veterans Hospital to Hillview Avenue have been previously modified. The portion of the creek between the old SPRR and Veterans Hospital is natural. Representative views of the creek are shown in Figure 2A through 2F.

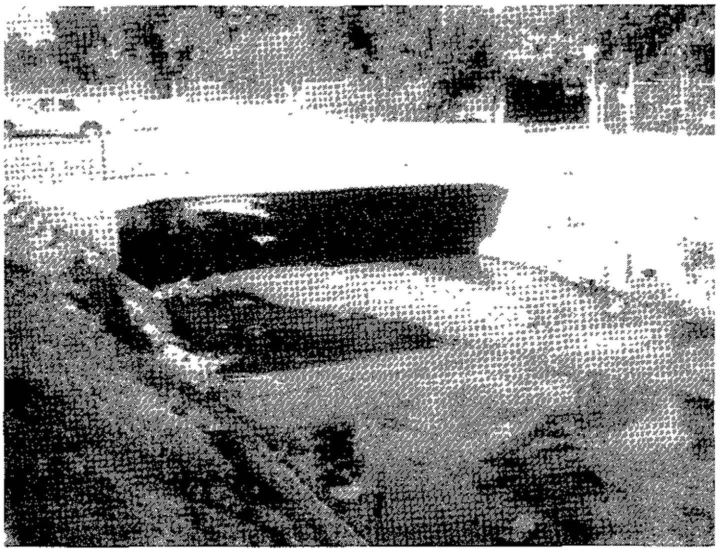
For convenience eleven reaches have been defined for the Matadero Creek study area. These are as follows:



Upstream side of Bayshore Freeway bridge. Note sediment deposition below bridge.
(S-1364-15)

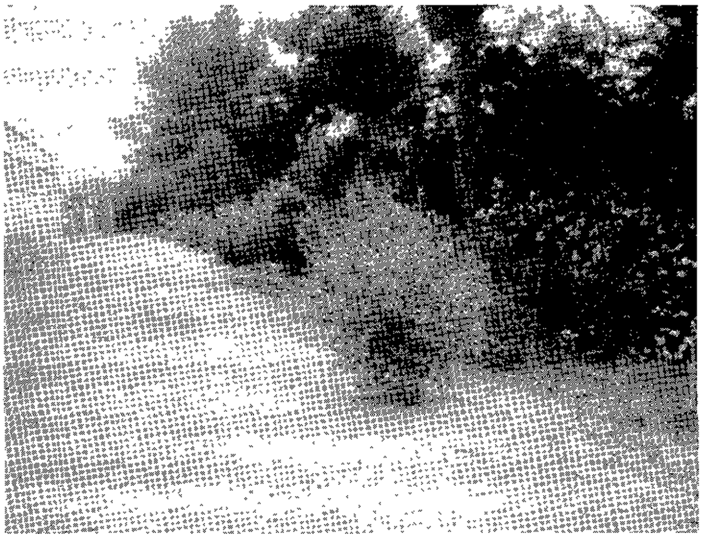


Looking upstream from Bayshore Freeway.
(S-1364-20)



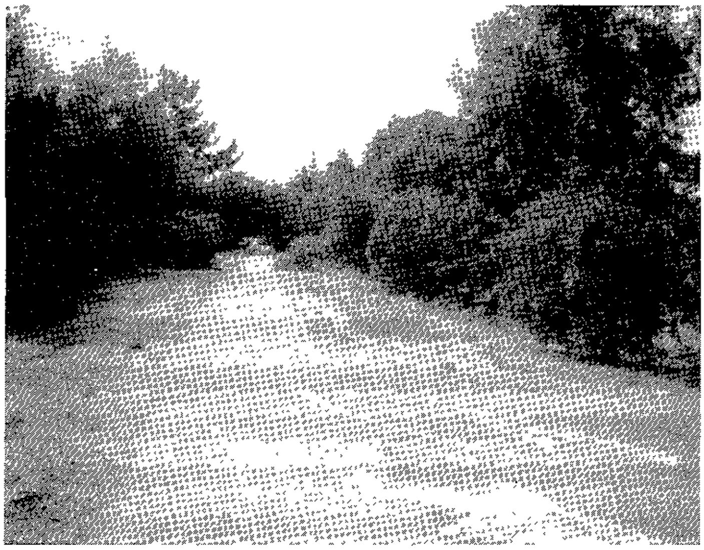
Downstream side of Greer Road bridge. Note restricted vertical clearance.
(S-2007-17)

FIGURE 2A
MATADERO CREEK CHANNEL
Bayshore Fwy to Greer Rd



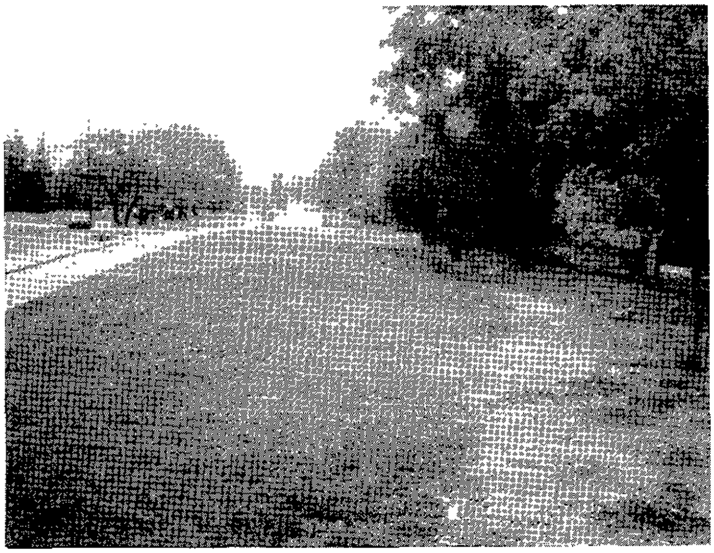
Looking toward El Camino Real along Stanford Channel right of way adjacent to Varian building # 1C. Proposed bypass channel would be located below earth berm. (S-2076-17)

Looking upstream along Stanford channel right of way adjacent to Varian building #2. Proposed underground bypass channel would be located below earth berm. (S-2076-13)

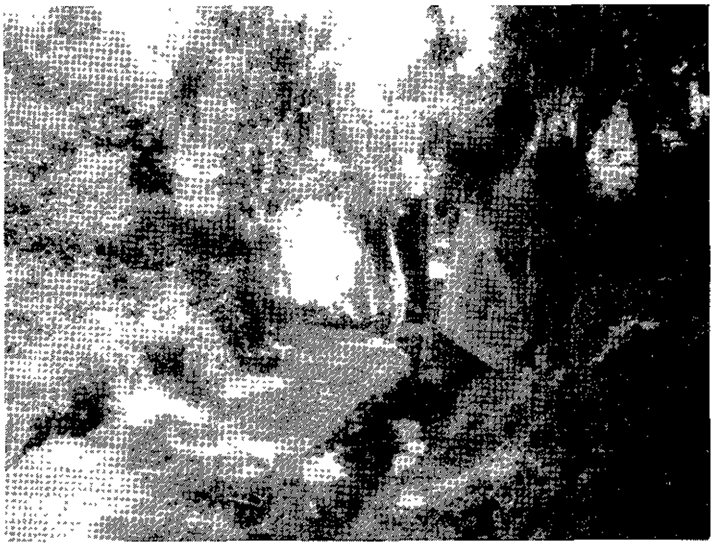


Looking southerly along City's bike path near southwesterly corner of Varian. Proposed bypass channel would be located below bike path. (S-2076-23)

FIGURE 2B
MATADERO BYPASS CHANNEL
El Camino to Bol Park

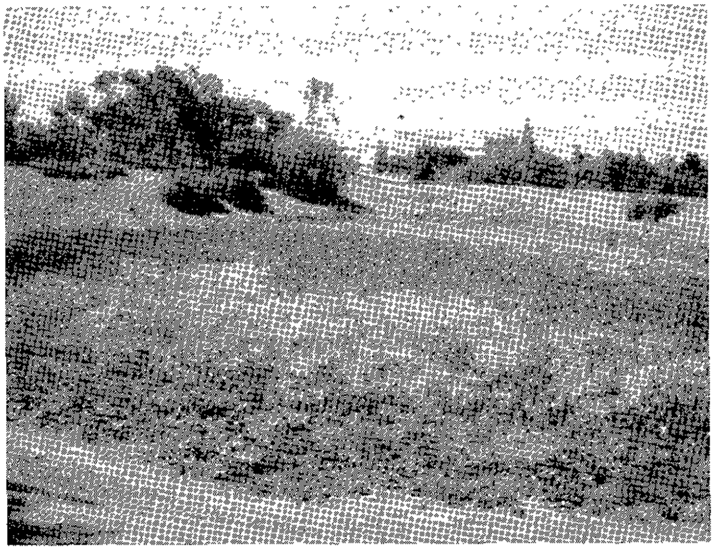


Looking toward Bol Park along alignment of proposed underground Bypass Channel. Note bike path in distance and Laguna Avenue on left. (S-2007-12)



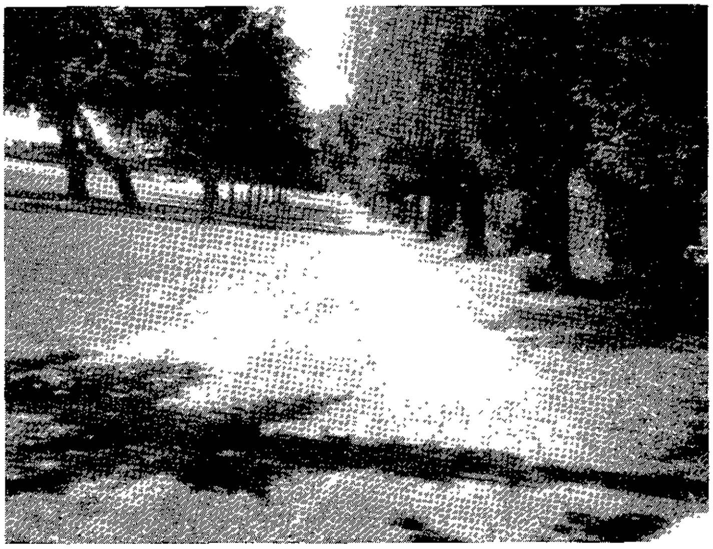
Looking at upstream side of bike path bridge near Bol Park. Intake to proposed Bypass Channel would be on left wing wall of bridge. (S-1904-36)

FIGURE 2C
MATADERO CREEK CHANNEL
Upstream of Bol Park



Looking at the Barron Creek sediment basin. Intake to proposed Barron Diversion Channel would be at opposite corner toward bike path. (S-2007-36)

Looking northerly along bike path and proposed alignment of the underground Barron Diversion Channel. Note that bike route detour will be implemented during construction. (S-2016-19)

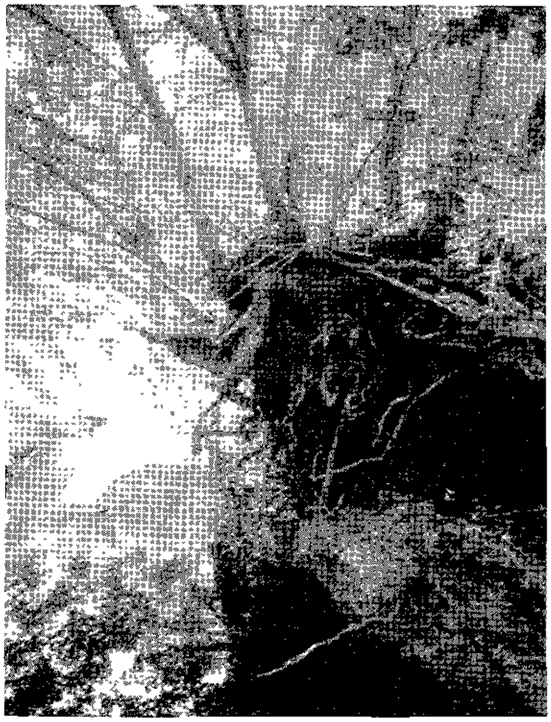


Looking northerly along Gunn High School's bike path that will be upgraded and used as detour rout during construction of Barron Diversion Channel. (S-2016-16)

FIGURE 2D
BARRON DIVERSION CHANNEL
Sediment Basin to
Matadero Creek

Erosion threatens a large oak tree upstream of Hillview Avenue on Matadero Creek. (S-1705-15)

Erosion on bank at Sungene Company on Hillview Avenue caused loss of vegetation and adjacent parking lot. (S-1705-14)



Erosion downstream of Foothill Expressway threatens a California Buckeye tree and adjacent property. (S-2014-6)

FIGURE 2E
MATADERO CREEK EROSION

Reach 1: Palo Alto Flood Basin to Bayshore Freeway
Reach 2: Bayshore Freeway to Greer Road
Reach 3: Greer Road to Cowper Avenue
Reach 4: Cowper Avenue to Alma Street
Reach 5: Alma Street to Park Boulevard
Reach 6: Park Boulevard to El Camino Real
Reach 7: El Camino Real to Matadero Avenue
Reach 8: Matadero Avenue to Laguna Avenue
Reach 9: Laguna Avenue to Old SPRR Bridge
Reach 10: Old SPRR Bridge to Hillview Avenue
Reach 11: Hillview Avenue to Foothill Expressway

City of Palo Alto Policies

The Palo Alto Comprehensive Plan (9) adopted February 2, 1981 addresses storm water runoff and flooding. "Excessive runoff of storm waters presents problems for the environment and the human occupants of the area. Problems include erosion, siltation, and downstream flooding".

The following policy was adopted by the City and pertains to this study:

Policy 1: "Maximize water retention and minimize the quantity and effects of runoff."

Four programs have been identified by the City that should be put into effect. One of the programs relates to the existing flood problem and underscores the constraints of flood control:

Program 4: "Participate actively in the required National Flood Insurance Protection Program."

> "Urban development has encroached on the natural floodplains and floodways in the flatlands and Baylands. It is not feasible to remove existing development from flood hazard areas, but precautions can be taken in the further development of those sites to minimize the potential for damage from floodwaters. Such precautions would include channels, retention basins for floodwaters, and elevation of structures."

Previous Studies and Constructed Projects

Studies: One of the first comprehensive investigations of Matadero Creek was the 1942 study (26) by the City of Palo Alto in conjunction with the U. S. Army Corps of Engineers. The report evaluated recent flooding problems, flood damages, and proposed construction measures designed to decrease flooding from Matadero and San Francisquito Creeks. Modifications were also proposed for the Palo Alto Flood Basin.

In the years just prior to 1942, many flood control and drainage projects were undertaken by the City. Land was purchased for the Palo Alto Flood Basin from Leslie Salt Company at a cost of $94,800. Levees and tide gates were constructed for the flood basin at a cost of $17,800 and the Matadero Creek channel was excavated at a cost of $860. Even with these various modifications in place, the capacity of Matadero Creek near Alma Street was estimated to be just 600 cfs in 1942 (26).

In 1956 a flood control planning study was conducted for various streams in the Northwest Flood Control Zone. The recommendation for Matadero Creek was construction of a trapezoidal concrete-lined channel between El Camino Real and Junipero Serra Boulevard (now known as Foothill Expressway), deepening and widening of the existing earth channel from Bayshore Freeway to El Camino Real and concrete lining of the bottom of all the existing bridges in this reach. Because of strong public opposition to concrete lining upstream of El Camino Real, this project was abandoned. The funds generated from the passage of bonds were spent on concrete lining the channel downstream of El Camino Real. The project was built in 1958.

A study conducted by Harry N. Jenks for the District in 1957 investigated the feasibility of constructing a dam on Matadero Creek, one-half mile upstream of Foothill Expressway. This study concluded that dam construction for water supply purposes was not economically feasible and no further studies were done.

A report on outfall channels for Matadero, Adobe, and Barron Creeks (Palo Alto Flood Basin), was prepared by the District in 1964. This report considered two alternatives toward solving the problem of tidally induced flooding: (1) Improve Palo Alto Flood Basin by raising levee heights near the Bay to elevation +9.5 feet and upstream of Bayshore Freeway to elevation +7 feet; excavating the bottom of about 440 acres of the Palo Alto Flood Basin to an elevation of -3.5; and improving the waterway openings for the creeks under Bayshore Freeway; (2) Construct large outfall channels for Matadero and Adobe-Barron Creeks by raising levee heights near San Francisco Bay to elevation +9.5 feet, and to elevation +8.7 feet at the upstream of Bayshore Freeway; and improving the waterway openings under Bayshore Freeway. Alternative 1 was implemented.

An investigation of the saltwater flooding problem was done by Tudor Engineering for the District in January 1973. Findings of the study include recognition of the Baylands as a unique area of the County with special environmental, hydrologic, seismic, and flooding problems. The study considered several alternatives for providing flood protection and developed recommended design standards. The recommended height of all new inboard levees was elevation 13.0 feet.

Constructed Projects: Several projects have been constructed in an effort to reduce erosion and flooding. These are briefly described in this section.

The first efforts date back to 1940 when the Matadero stream channel was extended and the flood basin concept was first undertaken.

The District constructed improvements on Matadero Creek in 1958 consisting of an earth channel with sacked concrete side slopes from Bayshore Freeway to Greer Road and varying sizes of concrete-lined channel between Greer Road and El Camino Real.

In 1959 the District constructed the Stanford Channel. The channel has a drainage area of about one square mile and flows into Matadero Creek under El Camino Real. This channel consists of an 83-foot long 12 x 8-foot concrete box culvert connecting to the existing Matadero Creek 20-foot wide concrete box culvert. This 12 x 8-foot concrete box is preceded upstream by a 100-foot long concrete open channel which incorporates two drop structures and connects to the existing concrete pipe section of Stanford Channel.

To provide access to the existing Matadero Creek concrete channel, the District constructed two access ramps. One is located on the downstream side of Alma Street and the other at Louis Road.

A levee raising project was undertaken by the District in 1971, which extended from Bayshore Freeway to 800 feet upstream of Greer Road. This project consisted of raising the existing levees to elevation 6.5 feet NGVD and constructing a retaining wall on the outer sides of the levees to elevation 7.5 feet NGVD.

In 1972 the District constructed an access ramp to the existing concrete channel on the upstream side of Park Boulevard.

Sacked concrete stream bank protection and an access ramp through Bol Park were constructed by Santa Clara County in 1972 in conjunction with the construction of the Bol Park Project.

Geologic and Hydrogeologic Setting

Thick deposits of unconsolidated alluvial fill and aggregate have washed down from the mountains into the valley floor to a maximum thickness in excess of 1,500 feet. The alluvial fill that comprises the groundwater basin has been deposited as gently sloping granular alluvial fans spreading out onto the valley from the streams as they emerged into the valley from the mountains. The basin and shallow marine deposits in the flat interior baylands consist predominantly of fine grained deposits, silt and clay.

The project area occurs within the mid to lower alluvial fan surface through basin and shallow marine deposits of the baylands. Within this reach, the principal or lower aquifer zone (below depth of 150 feet) is confined. The upper aquifer zone (which includes aquifers within 100 feet of the land surface) is either unconfined (water table condition) or confined. Groundwater recharge to the lower aquifer zone is through lateral aquifer connections from the elevated portions of the alluvial deposits which comprise the unconfined forebay portion of the basin. The upper aquifer zone is recharged both laterally from the forebay and from seepage to the water table from surface sources.

At the upstream end of the study area, Matadero Creek flows across the Santa Clara formation, of tertiary age, which consists of compacted to loosely-consolidated conglomerates, sandstones, and siltstones. At approximately Lagauna Avenue, the creek enters an alluvial fan composed of gravel and unconsolidated materials consisting of sands and silty sands, deposited by streams as they flow into the valley. Further downstream, between Alma and Middlefield Roads, the area is mapped as interfluvial basin deposits, primarily organic clays and silty clays (Helley & Brabb, 1971). Downstream from this area are "older bay muds". Franciscan bedrock is located at depth in the study area.

Historic Stream Channel and Flood Control Works

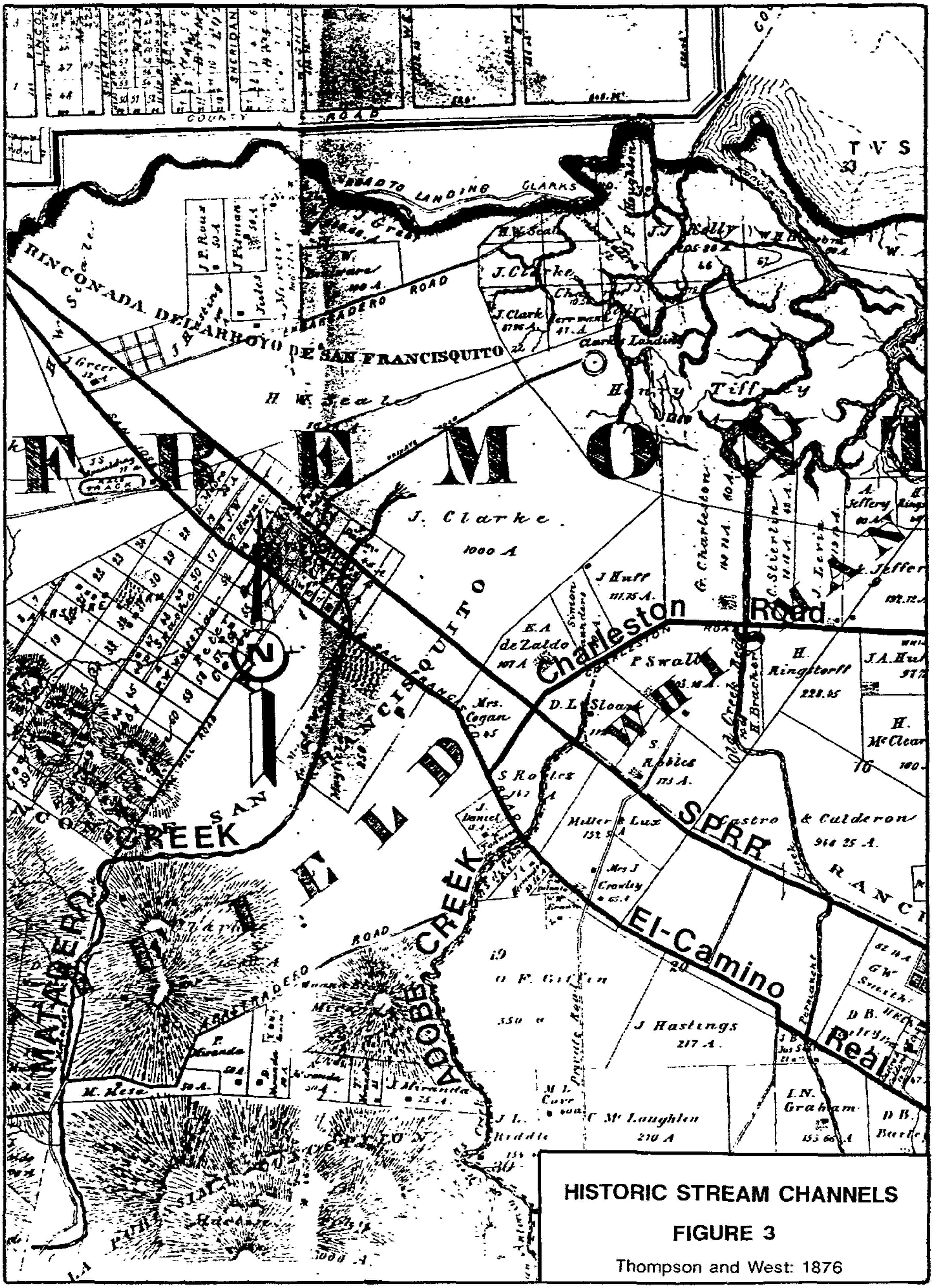
As the channel of Matadero Creek meandered down the surface of the gently sloping alluvial fan, it appeared to be confined to a well-defined incised channel. As it crossed the Southern Pacific Railroad, the channel lost its definition as the land surface flattened out in the basin and marine baylands (see Figure 3). Streamflows seem to have overflowed and eventually discharged into San Francisco Bay through Mayfield Slough.

As agriculture expanded in the area, Matadero Creek was extended as an earth ditch out to the baylands. The flood basin concept was first implemented in about 1940 by the City of Palo Alto. Following the severe flood of 1955, the Matadero stream channel was lined with concrete to increase its capacity and prevent erosion. Downstream of Alma Street, Matadero Creek is entirely a man-made channel and never existed as a natural watercourse.

Land Subsidence

Land subsidence, a lowering of the land surface, has occurred at varying rates from about 1920 to 1969. Subsidence resulted as artesian pressures in the lower aquifers were reduced by overdraft pumping of the groundwater basin.

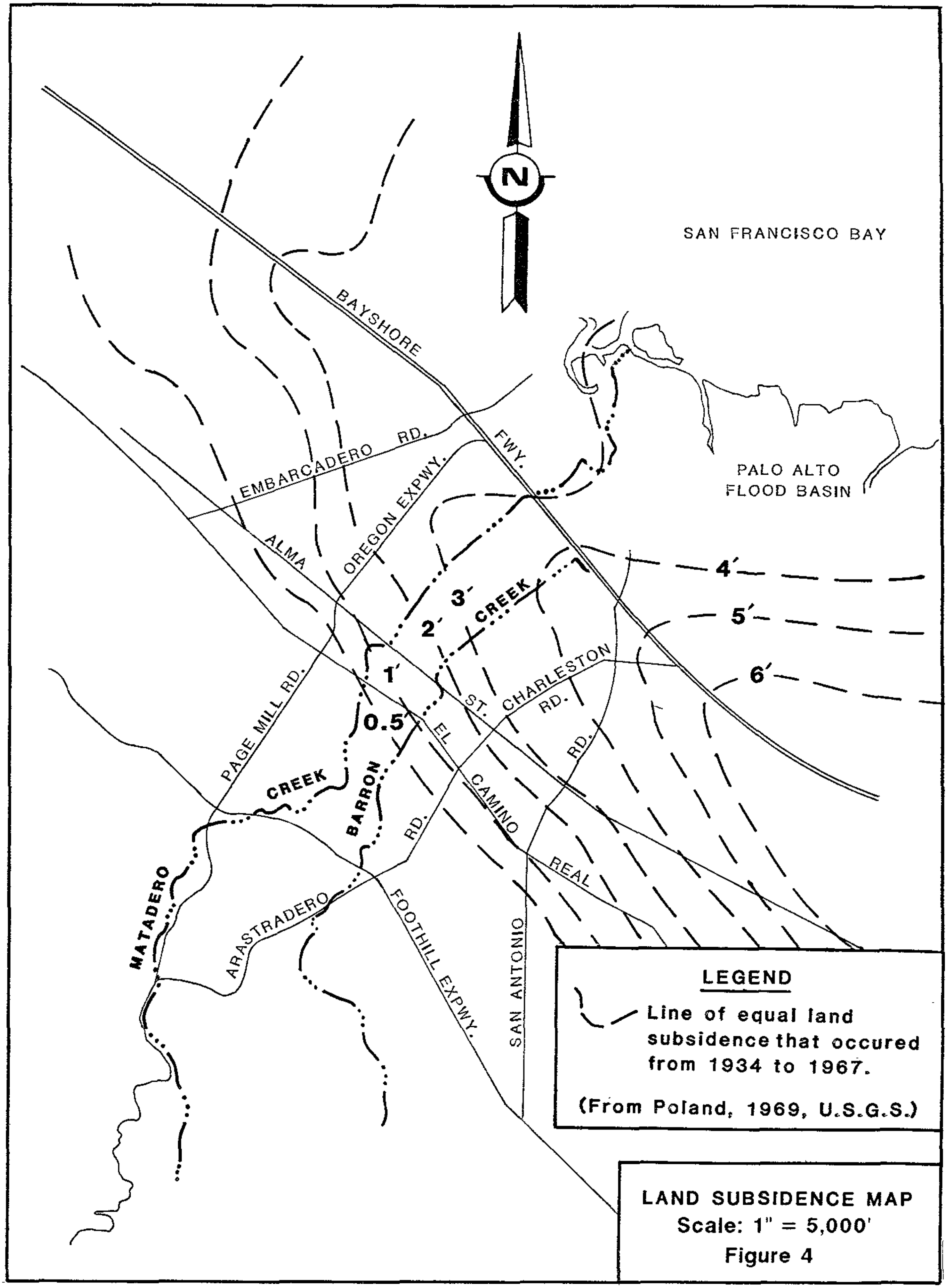
One of the locations of greatest subsidence is located in Mountain View at the intersection of Highway 101 and Highway 237, where about seven feet of subsidence was noted to have occurred between 1934 and 1967 (see Figure 4). The total amount is more



HISTORIC STREAM CHANNELS

FIGURE 3

Thompson and West: 1876



LEGEND

Line of equal land subsidence that occured from 1934 to 1967.

(From Poland, 1969, U.S.G.S.)

LAND SUBSIDENCE MAP
Scale: 1" = 5,000'
Figure 4

because subsidence actually started about 1920 and continued until 1969. The maximum subsidence in the study area is about three feet. The lowest sag point along the profile of Matadero Creek is between Middlefield Road and Highway 101. Levees and floodwalls were constructed in 1971 along stream channel banks in this area in order to compensate for subsidence and contain floodwaters to the channel. The problem is further complicated by the fact that sediment tends to deposit at the sag point and reduce the channel capacity. Readers interested in a more comprehensive treatment of the issue should read Appendix H.

Groundwater Levels

The depth to groundwater in the upper aquifer zone along the project varies considerably ranging from about 30 feet at El Camino Real to within five feet at Highway 101. These ranges vary somewhat with seasonal and long-term climatic fluctuations.

Seismicity

Santa Clara Valley lies between the active San Andreas fault in the Santa Cruz Mountains and the Hayward-Calaveras fault system which occurs along the east side of the Valley and in the Diablo Range. It is thus considered to be located in a highly seismically active area. The San Andreas fault passes approximately ten miles southwest of El Camino Real.

The effects of ground shaking would present immediate danger to the stability of levee systems in the baylands area. Soils are weak and the water table is near the surface in the baylands, which makes it the area most likely to be strongly affected by seismic ground shaking. Damage to the channel would be in the form of bank instability conditions which might result in slumping, lateral spreading and/or sloughing of the banks and levees.

Seismic shaking of the general surface in the mountains and upstream watershed areas may also induce landsliding, lateral spreading and sloughing of the bank which may contribute a large sediment load to the sagged portion of the channel in the baylands, to aggravate an existing sediment deposition problem.

PROBLEM DEFINITION

This chapter describes the problems associated with Matadero Creek and Barron Creek. Historic flooding, potential 1% flood damages, local drainage, erosion and sediment deposition, and maintenance problems are discussed.

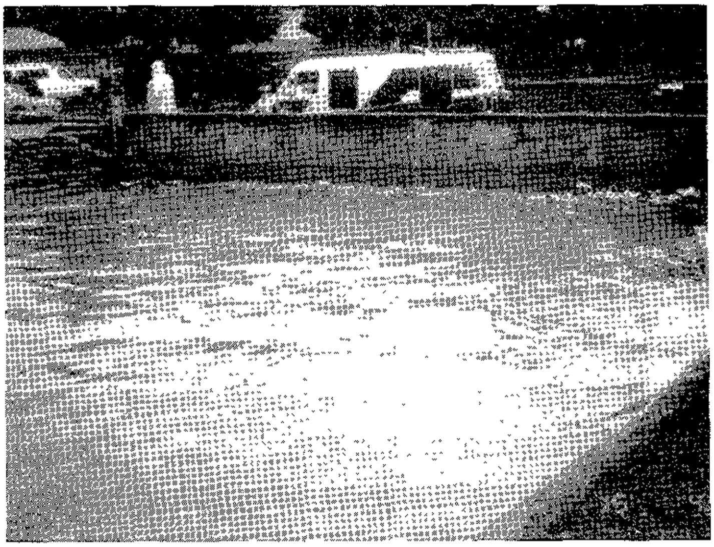
Historic Flooding

Flooding occurred along Matadero and Barron Creeks in 1941, 1952, 1955, 1958, 1973 and 1983. Matadero Creek flooded most recently in January 1983 at Matadero Avenue, Alma Street, Cowper Street, Middlefield, Ross and Louis Roads. Barron Creek flooded in 1983 at Laguna Avenue. Problems with the local storm drainage system have caused minor flooding several times.

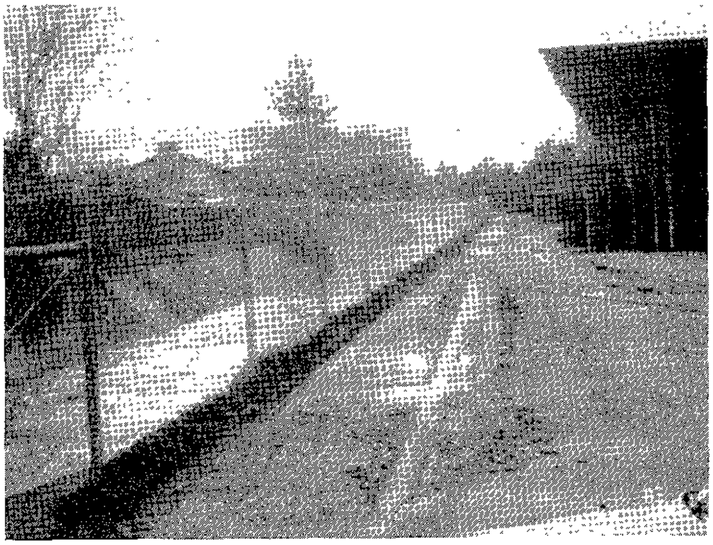
Photographs of various locations during floods are contained in Figure 5. The top photograph in Figure 5A is a vivid example of the "bottleneck" effect caused by an inadequate culvert in the creek channel. The center photograph in Figure 5A shows how an inadequate culvert will cause high water levels upstream and lead to the overflowing of creek banks.

Even though the channel has been enlarged and concrete-lined since the 1955 flood, the culverts have not. The potential for a situation similar to that depicted in Figure 5 still exists. However, the concrete lining has successfully prevented erosion that had previously occurred during high flows.

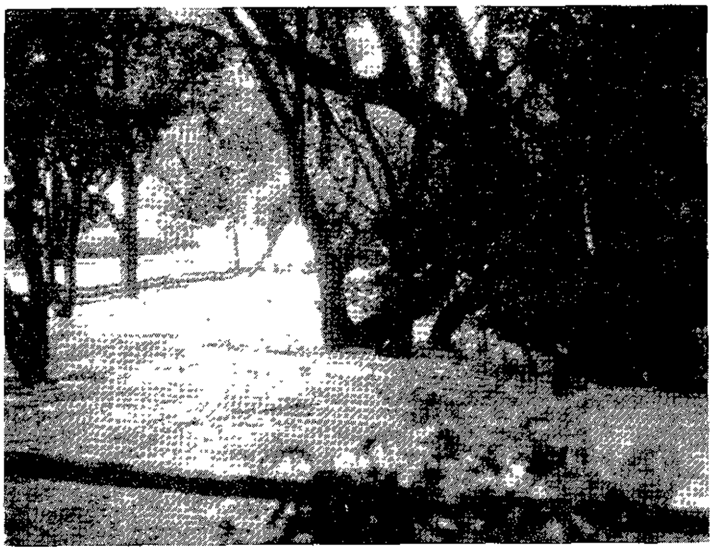
Matadero Creek flooded upstream of Highway 101 in December 1955 and April 1958 and at six culverts from Louis Road to Matadero Avenue during the January 1983 flood. These same areas have critical flood potential today.



Upstream side of Greer Road Bridge during the February 14, 1986 storm. High water is due to combined effect of the pool level in the flood basin and backwater caused by the bridge. (S-1689-3)

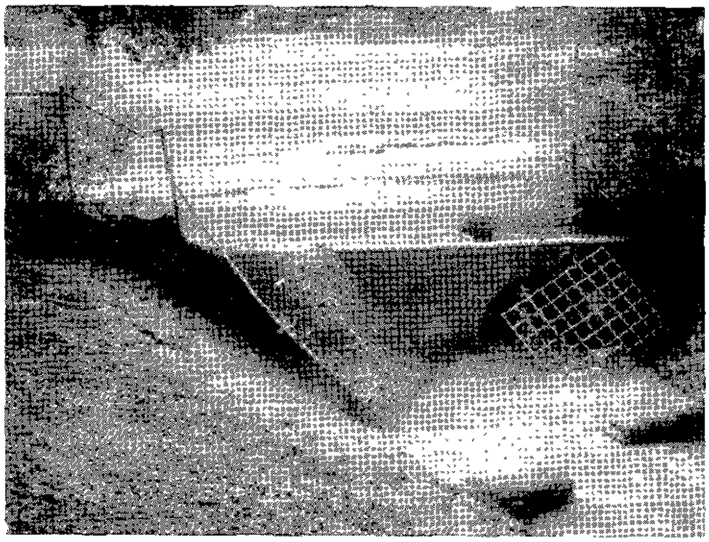


Looking upstream from Middlefield Road following the January 1983 flood. The debris line on the fence defines high water level caused by inadequate Middlefield Road bridge. (S-681-1)

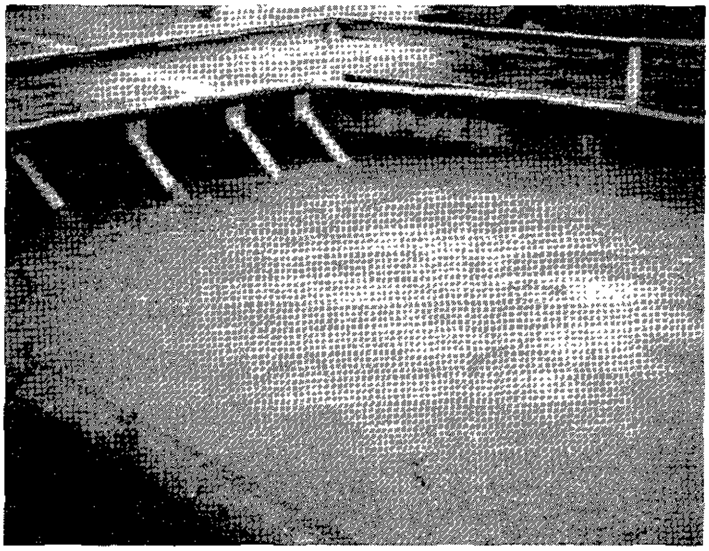


Looking downstream toward Matadero Avenue bridge during the 1973 flood. Note that this was prior to the enlargement of the Matadero Avenue bridge. (S-213-62)

FIGURE 5A
MATADERO CREEK FLOODING



Looking upstream toward Gunn High School after January 1983 flood. Fence was knocked down by floodwaters coming down the high flow swale. (S-682-1)



Upstream side of Barron Creek at Laguna Avenue during February 1986 high flow. Backwater is caused by inadequate underground pipe along Los Robles Avenue. (S-1688-44)

FIGURE 5B
BARRON CREEK FLOODING

The Engineer's Report of Proposed Improvements for the Northwest Zone prepared by the District in 1956 states: " . . .In the major storm of the 1940-41 rainfall year the area adjacent to Matadero Creek south of and through Palo Alto was flooded. No accurate estimate of damage was made at the time. . . ."

A report prepared by the Army Corps of Engineers in June 1956 indicates: . . . "Between 11:00 p.m. and midnight 22 December 1955, culverts in the vicinity of Stanford University Campus and the western city limits of Palo Alto poured water into the city streets, flooding Highway U. S. 101 and inundating the Mayfield School. The total area flooded was 102 acres of residential and commercial property. Overflow waters did little damage in homes. Debris-laden overflow waters poured through a large warehouse area, depositing tons of silt and debris. The overflow rejoined the creek in the vicinity of the Southern Pacific Railroad. At its crest, the flood water was three inches above the Bayshore Highway pavement. The receding flood waters revealed that creek banks had been eroded and degradation of the channel bottom had resulted in the channel being enlarged by 20 to 30 percent. . . ."

Another report prepared by the Army Corps of Engineers following the April 1958 floods states: "Flooding along Matadero Creek first occurred on Stanford Avenue near Stanford University. Inundation was limited to streets and yards of residences as far down as El Camino Real. Additional flooding occurred below the Southern Pacific Company's railroad tracks, draining over El Camino Real. In this area, several businesses had water above the floor level. No further flooding occurred until the channel reached Bayshore Highway, where it spread out and ponded against the highway. Damages from flooding of Matadero Creek were limited to minor cleaning of streets and yards. Commercial damages were minor."

According to "The Palo Alto Times" of April 3, 1958, reporting on the flooding of Matadero Creek: . . ."Alma Street was barricaded between Page Mill Road and Loma Verde because of flooding from Matadero Creek." . . . "One southbound lane of El

Camino was blocked by water most of the way from Page Mill Road to Mountain View" .. "Water flowed out of Matadero Canal over the Piers Dairy property east of Louis Road yesterday afternoon in Palo Alto. The water ran through the new city park nearby and into streets."

A Reconnaissance Report on Floods of January 21-24, 1967 prepared by the District in 1967 mentions: . . ."The high flows in the main channels of Adobe, Barron, and Matadero Creeks resulted in backing up of street drainage in Palo Alto causing flooding of streets and front yards in many areas."

Recent Flooding

A Report on Flooding and Flood Related Damages in Santa Clara County from January 1 to April 30, 1983, prepared by the District states: . . ."Flood waters left Matadero Creek at six locations; Matadero Avenue, Alma Street, Middlefield Road, Cowper Avenue, Ross Road and Louis Road. This is shown in Figure 6. Several homes near Matadero Avenue and the Flamingo Motel upstream of El Camino Real experienced minor flooding. Extensive erosion also caused damage to private and public property undermining retaining walls and one private bridge."

"On Sunday evening, January 23, floodwaters overbanked from Barron Creek at Laguna Avenue and affected 90 acres of residential area between Laguna Avenue and El Camino Real. In addition to major street flooding several homes suffered water damage from flows which overtopped the creek banks.

Representatives of the Barron Park Association prepared a summary of damages shortly after the flooding. Their figures showed that at least 60 residences and businesses were affected, with damages ranging from $100 up to $22,000 for a preliminary estimated total of $100,000. It was reported that one home flooded inside to a depth of 30 inches. Early Wednesday evening, January 26, Barron Creek overbanked again, causing additional flood damage."

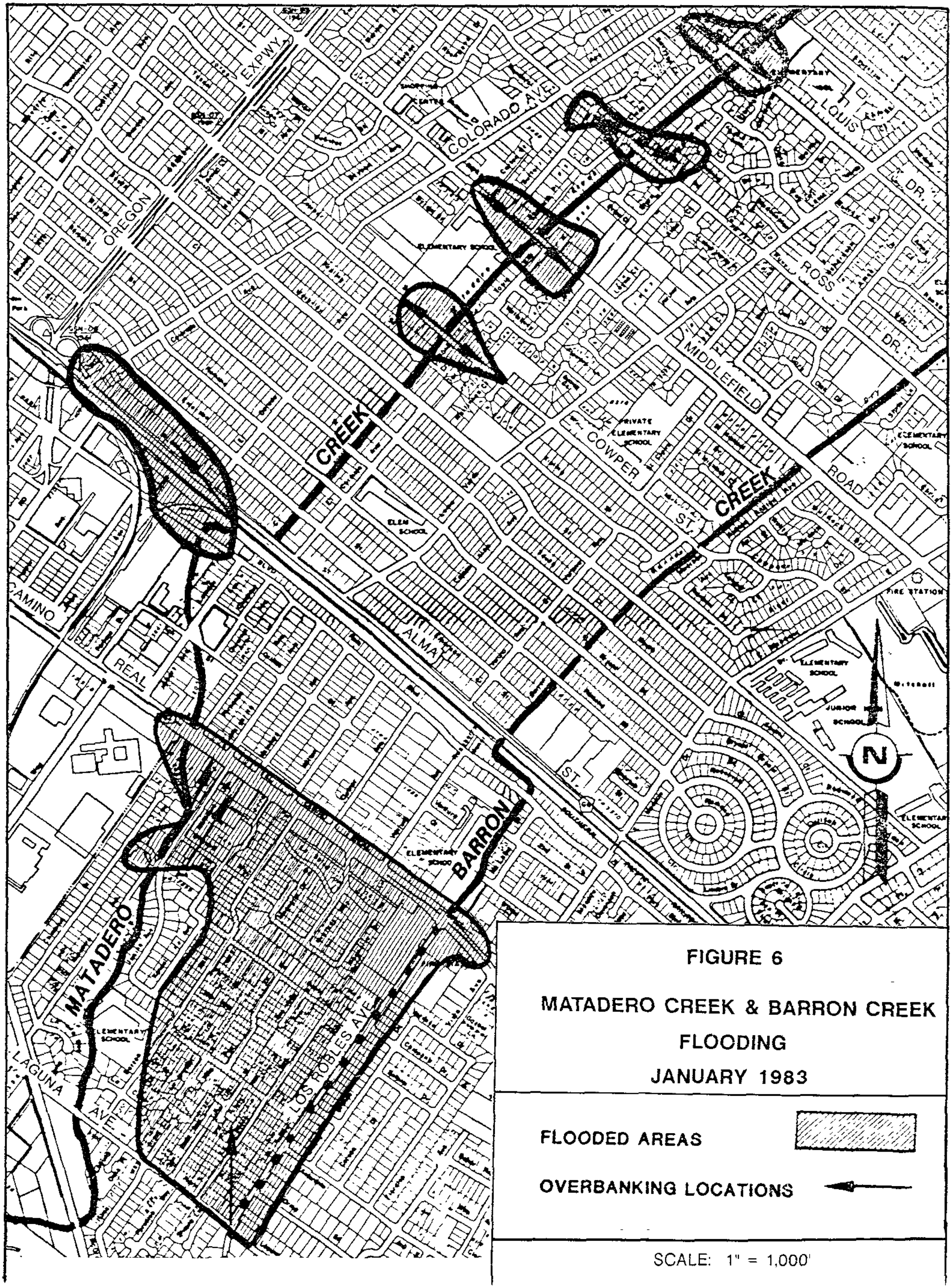


FIGURE 6

MATADERO CREEK & BARRON CREEK FLOODING JANUARY 1983

FLOODED AREAS ▨

OVERBANKING LOCATIONS ←

SCALE: 1" = 1,000'

The most recent high flow occurred on February 14, 1986. No actual flooding was known to have occurred but many locations experienced very high water. The Greer Road culvert flowed under pressure because of a high water surface elevation in the flood basin and moderate creek flow. Because of high flows and sediment deposition, the Hillview culvert flowed under pressure for the downstream portion under the Watkins-Johnson facility. Several areas of bank erosion including the collapse of adjacent parking lots and trees, occurred upstream of Hillview Avenue.

Description of the One Percent Flood

Matadero Creek

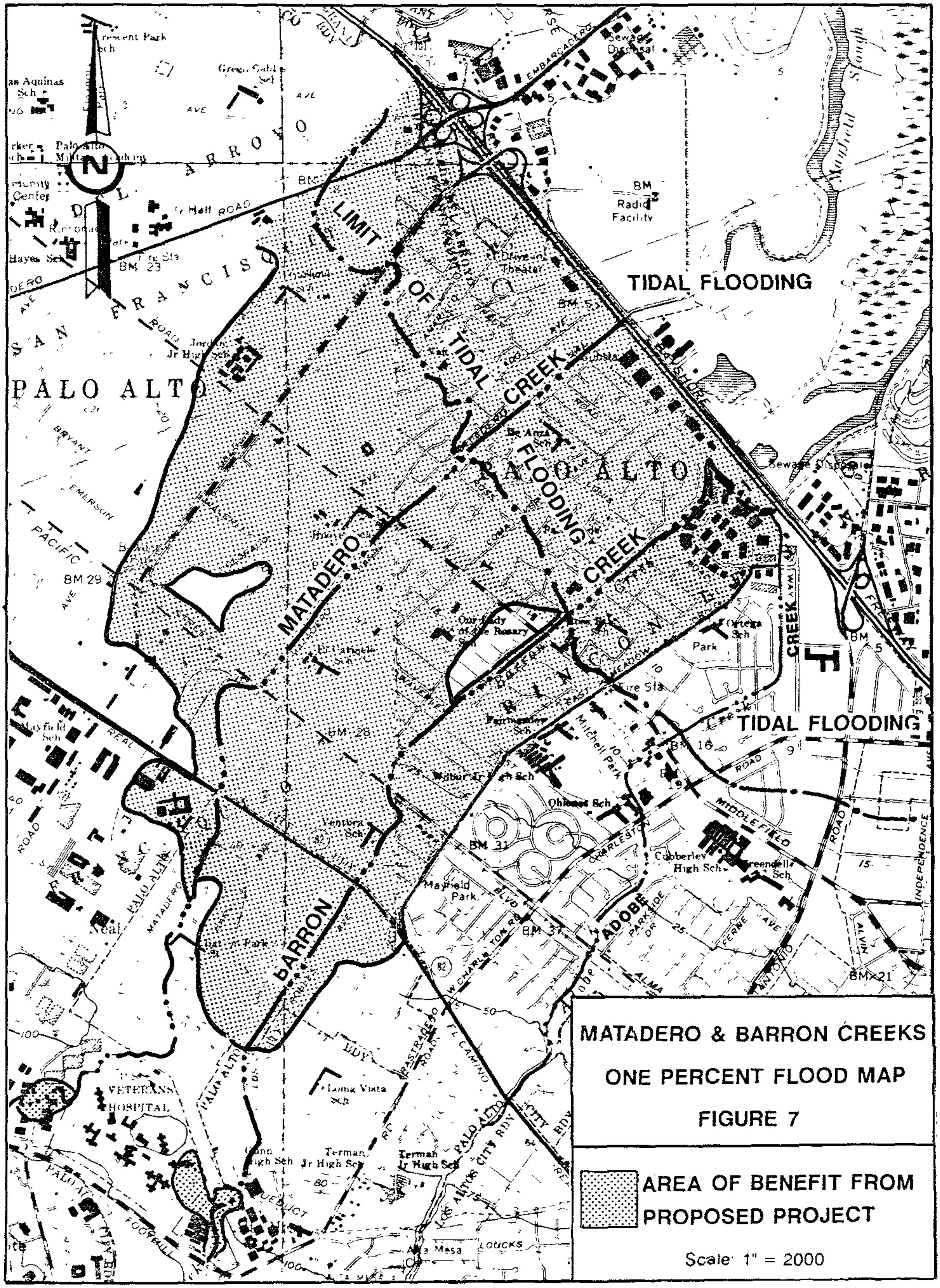
The area subject to flooding from a one percent event is shown in Figure 7. This map is based on Flood Insurance Studies sponsored by the Federal Emergency Management Agency (FEMA) in November 1978 (reference 21). Much of the area is threatened by flooding from at least two creeks as well as high tides from San Francisco Bay.

Downstream of Ross Road is subject to saltwater flooding in the event of high tides and subsequent overtopping of the bayfront levees in San Francisco Bay. The latest Corps of Engineers Tide Study (Reference 10) indicates a 1% tide elevation of 7.8 feet NGVD. Floodwaters from the Bay would cross the Bayshore Freeway and inundate residential, industrial and commercial buildings to depths of as much as four feet.

The area to the south of Matadero Creek is subject to flooding from Barron as well as Matadero Creek.

The area to the north of Matadero Creek upstream of Ross Road is subject to flooding from Matadero Creek only.

The limit of the detailed Flood Insurance Study conducted by FEMA was 800 feet downstream of Hillview Avenue; the outlet of the box culvert under the Watkins-Johnson facility. Capacity of this culvert is about 1,800 cfs while the 1% design flow rate is 2,200 cfs. As a result, a spill of about 400 cfs would occur at the upstream end of the



MATADERO & BARRON CREEKS

ONE PERCENT FLOOD MAP

FIGURE 7

▨ AREA OF BENEFIT FROM PROPOSED PROJECT

Scale 1" = 2000

culvert near Hillview Avenue. Because it is upstream of the detailed Flood Insurance Study the flooding does not appear on the Flood Insurance Rate Map (FIRM).

Downstream of the culvert outlet 1,800 cfs would flow with several feet of freeboard until the old SPRR bridge in Bol Park. This bridge is very narrow and causes several feet of backwater upstream but no overbanking. High flow velocities would occur downstream of the bridge but the 1,800 cfs would be contained within the natural channel.

The water surface elevation for the downstream portion of Bol Park is controlled by a constriction downstream of Laguna Avenue. The constriction exists because of a large oak tree on the south bank and a retaining wall on the north bank.

Between Laguna Avenue and the upstream side of Matadero Avenue the stream channel would flow with a bank full condition at about 1,800 cfs.

Just upstream of the Matadero Avenue culvert flow would begin to overbank because of backwater caused by the narrow downstream channel and the culvert. About 1,600 cfs would pass through the Matadero Avenue culvert while flowing under pressure and about 200 cfs would overbank. Most of the floodwaters would travel northeasterly flooding many single family homes along Matadero Avenue and Chimalus Drive. Floodwaters would pass through the Varian facility and the northerly limit of flooding would be defined by the embankment of the old SPRR tracks. These floodwaters would eventually cross El Camino Real and re-enter the channel through the local storm drains and direct overland flow into the channel.

Downstream of Matadero Avenue the stream channel has a capacity of about 1,500 cfs and would flow bank full with about 100 cfs overbanking to the north into the motel property.

The Stanford channel would add about 200 cfs of local drainage at its confluence with Matadero Creek under El Camino Real. The addition of overland floodwaters and other local drainage would bring the total channel flow rate up to about 2,000 cfs downstream of El Camino Real.

The Lambert Avenue culvert would allow about 1,600 cfs to pass while flowing under pressure and about 300 cfs would overflow southeasterly. The floodwaters traveling southeasterly would combine with floodwaters originating from Barron Creek and pond behind the Southern Pacific Railroad embankment up to elevation 30 feet. Ponding to elevation 30 would also occur north of Matadero Creek and eventually overtop the railroad tracks and travel northeasterly down El Dorado Avenue. An additional 180 cfs would continue flowing northwesterly and parallel to the SPRR as shallow sheet flow and would flood the Page Mill Road underpass at the SPRR. The underpass would fill completely and floodwaters would break out on the easterly side and spread out as shallow sheet flow traveling parallel to Oregon Expressway toward Bayshore Freeway.

Some overland floodwaters and local drainage could get into the Matadero Channel downstream of Alma Street and bring the in-channel flow rate to about 1,800 cfs. The Waverly Street culvert can just pass this arriving flow under pressure flow conditions and near top of bank upstream.

At Cowper Street the culvert would pass about 1,700 cfs while about 150 cfs would overflow onto Cowper Street on both sides of the channel.

The Middlefield Road Culvert would pass about 1,600 cfs flowing under pressure and about 50 cfs would overflow the banks.

The Ross Road culvert would pass about 1,600 cfs flowing under pressure and bank full conditions upstream.

Additional local drainage and the reentry of overland floodwaters would increase the in-channel flow rate to nearly 1,900 cfs. About 1,500 cfs could pass the Louis Road culvert under pressure flow conditions while 120 cfs would overflow to the north and 280 cfs to the south along Louis Road.

The Greer Road culvert would pass the arriving flow of 1,500 cfs flowing under pressure. The upstream water surface would be above adjacent ground but contained by the existing floodwalls. Downstream of Greer Road the pumping stations would add about 275 cfs to bring the in-channel flow rate to 1,775 cfs at Bayshore Freeway. This arriving flow rate would pass the Bayshore Freeway with freeboard and flow into the flood basin.

More than 4,100 homes and apartments and 300 commercial and industrial buildings would be inundated. One percent flood damages (due to Matadero Creek only) are estimated to be about $18 million.

Barron Creek

The upstream limit of the detailed flood insurance study conducted by FEMA was the bike path bridge near the sediment basin. At this point, 760 cfs flows in Barron Creek filling the sediment basin and causing about 600 cfs flows through the underground pipe.

Where the pipe outlets into a semi-natural channel adjacent to Los Robles Avenue the flows would combine. Shallow sheet flow would travel down Los Robles Avenue and the major portion of flow would be carried in the channel.

At Laguna Avenue, the channel enters an underground pipe with a capacity of just 180 cfs. The balance of the 1% flow rate overflows the banks and spreads out in a northeasterly direction toward El Camino Real. The average flooding depth is less than one foot but can cause serious damage because there are no curbs or gutters in this area.

Local drainage and floodwaters enter the channel downstream of El Camino Real and bring the peak flow rate to about 270 cfs. At Southern Pacific railroad, the culvert causes flooding that ponds against the embankment. Flood depths average one foot and the flow rate downstream would be about 430 cfs.

More than 1,400 homes and apartments and 100 commercial and industrial buildings would be inundated. One percent flood damages (due to Barron Creek only) are estimated to be $14.5 million.

Tidal Flooding

The 1984 tidal study completed by the U. S. Army Corps of Engineers (10) indicates a 1% tide elevation of 7.8 feet NGVD in the Palo Alto area. Because portions of the bayfront levees were not engineered or properly constructed, they would be subject to catastrophic failure in the event of high tides or earthquakes. The Corps study supersedes the 1978 Flood Insurance Study which defined a 1% tidal elevation of 7.5 feet NGVD and delineated the low lying residential area west of Bayshore Freeway as being subject to tidal inundation. The tidal flooding area extends westerly to about Louis Road as shown in Figure 7. Tidal flooding and freshwater flooding from Matadero Creek are independent events.

Land Subsidence Effects on Flood Control

Land subsidence has occurred in the study area as a result of overdraft pumping of the groundwater basin. It is estimated that subsidence began about 1920 and continued through 1969. The ground level has dropped as much as three feet in the study area during this period.

San Francisco Bay fluctuates within a fixed range of tidal elevations. Matadero Creek flows into the Flood Basin, which discharges into the Bay through 16 tide gates. Because backwater effects from the Flood Basin can extend upstream into Matadero Creek, the result of land subsidence is higher water surface elevations in the creek relative to adjacent lands. In the areas of greatest land subsidence there is little alternative but to add floodwalls or levees to the creek in order to contain floodwaters.

Land subsidence aggravates local drainage problems; particularly downstream of Louis Road. Pumping stations must be installed in order for adjacent land to drain into the creek. Existing ground elevations from Louis Road to Highway 101 range from about 3.5 to 6.5 feet, NGVD. It is not uncommon for the water surface in the creek to exceed this range of elevation and cause problems for gravity drainage systems. Pumping stations have been installed by the City of Palo Alto to improve local drainage along

Matadero Creek and Adobe Creek. The Matadero Creek pumping station is located about 600 feet upstream of Highway 101 and has an output capacity of about 240 cfs. The Colorado pumping station is located immediately upstream of Highway 101 and has an output capacity of 25 cfs.

Local Drainage Problems

Within the context of this study, local drainage is defined as the system of gutters, storm drain inlets, storm sewers, and outfall structures that convey local surface runoff into the creek or flood control channel. The local drainage facilities are owned, operated, and maintained by the City of Palo Alto (within city limits).

Flood control facilities are defined as the major water courses, channels, or reservoirs into which the local drainage systems empty. Where rights of way are owned, these facilities are maintained by the Santa Clara Valley Water District.

There is a local drainage problem along Matadero Creek in the downstream portion of the study area that has been aggravated by land subsidence. Ponding of water in streets has occurred several times in the areas near Louis Road and Highway 101. This is in the vicinity of maximum land subsidence. The local drainage system on the south side of the creek is designed to discharge into Matadero Creek by gravity. The north side of Matadero Creek in the same area does not have a problem because it is serviced by the two pumping stations built by the City in 1960 and 1968. Upstream of Middlefield Road the local drainage facilities have not been significantly affected by subsidence.

Another site with a local drainage problem is the easterly end of Chimalus Drive near El Camino Real. Because of the absence of curbs and gutters and the grading of the area surface drainage tends to accumulate in the yards of the homes along the northerly side of the street.

Maintenance Problems

The District is responsible for maintenance within most of the Matadero and Barron Creeks study area. Upstream of the old SPRR bridge near Bol Park, the District's policy is to perform maintenance work only where right of way is owned. In those areas where the District does own land in fee or possess a flood control easement, major maintenance efforts include sediment removal, erosion repair, fence repair, and vegetation and weed control.

Downstream of the Bayshore Freeway, Matadero Creek extends abouts 1,000 feet before opening into the Palo Alto Flood Basin. The channel is defined by the Matadero levee on the northerly side and the earth pad of the city's Municipal Service Center on the southerly side. The channel consists of about a 30-foot wide main channel along the northerly side and a broad floodplain that varies from 80 to 150 feet in width on the southerly side. This reach is strongly influenced by backwater from the flood basin pool level. Since the original excavation of the Matadero Channel, this reach has gradually become vegetated with willows, bamboo, and black walnut trees. Under agreement with the California Department of Fish and Game, the floodplain area is selectively cleared of undergrowth, using hand equipment only, to maintain an unobstructed floodway.

Between Greer Road and Bayshore Freeway, the existing channel has an earth bottom 40 feet wide and sacked concrete side slopes. The slope of the channel is very flat, flow velocities relatively slow and as a result suspended sediment tends to deposit. The water surface elevation of the Palo Alto Flood Basin is maintained at -2.0 feet NGVD by the City of Palo Alto and, consequently, backs up in Matadero Creek to near Louis Road. The combination of silt deposition, ponded water and an earth bottom encourages growth of emergent vegetation. To maintain flow carrying capacity, the channel is periodically cleaned out by District forces. Because the channel bottom is not lined, there are no depressed maintenance roads, and vertical clearance is restricted at both Greer Road and Bayshore Freeway, maintenance is difficult, slow, and costly. The present sediment removal procedure is for the equipment to operate from the maintenance roads at the top of each bank.

From Louis Road to Greer Road, the channel is concrete-lined with a 20-foot bottom width. An access ramp on the downstream side of Louis Road provides an entry point to the channel bottom. Sediment, debris, and vegetation can be removed with heavy equipment working from the channel bottom without any difficulty. Restricted vertical clearance at Louis Road and Greer Road prevents passage of heavy equipment and requires exit at the same Louis Road ramp.

Between Cowper Street and Louis Road, the channel is concrete lined with a 13-foot bottom width. There are no access ramps to the channel bottom in this reach and vertical clearance is impaired at Cowper Street.

The channel between Alma Street and Cowper Street is concrete-lined with a nine-foot bottom width. A maintenance access ramp is located on the downstream side of Alma Street but is the only one in this reach.

Between Park Boulevard and Alma Street, the channel makes four 90° turns, passes under the SPRR, and has no maintenance access ramps. Debris and sediment tend to clog the SPRR bridge because of the curving approach channel and the large bridge piers that obstruct flow passage. The northerly cell of the SPRR culvert fills with sediment and debris because of the flow patterns that develop. Debris is removed from the SPRR bridge piers by equipment working from the top of bank. The channel downstream of SPRR is self cleaning because of high flow velocities and a straight unobstructed channel.

Between El Camino Real and Park Boulevard, the channel is concrete lined with a nine-foot bottom width. There is one maintenance access ramp located on the south bank about 150 feet upstream of Park Boulevard. Maintenance in this reach has not presented any special problems and consists mostly of routine sediment removal near the ramp.

The stream channel is mostly natural between Matadero Avenue and El Camino Real. Several private bridges cross the creek in this reach. A maintenance access ramp provides an entry point to the channel bottom 300 feet downstream of Matadero Avenue. The primary maintenance concern in this reach has been erosion repair and to a minor degree, debris removal.

From Laguna Avenue to Matadero Avenue the stream channel is mostly natural but has been experiencing erosion. The District has made several erosion repairs, most consisting of sacked concrete. High flow velocities through the narrow channel section downstream of Laguna Avenue caused bank and streambed erosion and required construction of a retaining wall and sacked concrete to avoid erosion damage to private property. There is one maintenance access ramp at the Barron Park Elementary School.

The channel is natural and heavily vegetated between the old SPRR bridge and Laguna Avenue. Erosion on the south bank was originally scheduled to be repaired in 1986 with mattress gabion lining but was suspended because of a lack of bids on the construction project. Severe erosion on the south bank, just downstream of the old SPRR bridge, was repaired with gunite as an emergency measure following the 1983 floods. A maintenance access ramp on the north bank 100 feet downstream of the old SPRR bridge provides an entry point to the channel bottom in this reach.

Between Hillview Avenue and the old SPRR bridge, the District owns a discontinuous right of way. There are no maintenance access ramps in this reach and there is no program of routine maintenance. Between the outlet of the Hillview culvert and the old SPRR culvert the channel is deep and has ample capacity. The stilling basin located at the culvert outlet collects sediment and debris, but has no means of maintenance access. Sediment in the stilling basin can significantly reduce the capacity of the Hillview culvert.

Upstream of Hillview Avenue, the District owns no right of way and consequently conducts no maintenance measures. The channel is actively eroding and has impacted adjacent parking lots and facilities. Debris and sediment from eroded banks gets transported downstream and ultimately deposits in the channel. Two large sacked concrete erosion repairs were completed in 1986 just upstream of Hillview on the southerly bank. The work was done by the land owner under permit from the District. The approximate cost of these repairs was $400,000.

COMPARISON OF ALTERNATIVES

This chapter describes the design criteria, special design constraints of the study area, and the alternative solutions considered.

Design Criteria

The preliminary design of all alternatives considered complies with District policy and is based on generally accepted engineering criteria for flood control projects. The standard policy of the District is that flood control channels be capable of conveying the one percent flood with freeboard. The one percent level of protection is consistent with policy of the Federal Emergency Management Agency (FEMA), the federal agency responsible for the administration of the National Flood Insurance Program (see Appendix I). FEMA is also responsible for the review and update of the Flood Insurance Rate Maps (FIRM), which are the basis of determining the flood insurance requirements and rates.

Design Flow Rates

The one percent and ten percent design flow rates for Matadero Creek are listed in Table 3. They are based on the March 1977 hydrology study (6) by the District.

TABLE 3

MATADERO CREEK
DESIGN FLOW RATES (cfs)

	Frequency	
Location	1% (100-yr)	10% (10-yr)
At Foothill Expressway	2,200	960
At El Camino Real	2,400	1,200
At Alma Street	2,500	1,400
At Bayshore Freeway	2,900	1,800

TABLE 4

BARRON CREEK
DESIGN FLOW RATES (cfs)

Location	Frequency 1% (100-yr)	 10% (10-yr)
At Gunn Sediment Basin	760	320
At El Camino Real	830	410
At Adobe Creek Confluence	830	460

Design Channel Roughness

Another parameter used in the design and analysis of streams and flood control channels is the channel roughness factor. Known as "Manning's n", this value accounts for the resistance to flow due to vegetation, streambed material, channel irregularity, and the degree of meandering.

Typical Manning roughness values used in this study are listed in Table 5.

TABLE 5

MATADERO AND BARRON CREEKS
DESIGN CHANNEL ROUGHNESS FACTORS

Channel Description	High "n" For Stage	Low "n" For Velocity
Concrete Lined	.016	.013
Sacked Concrete	.028	.020
Gabion Lined	.040	.035
Natural Stream	.060	.040

Design Freeboard

A third design parameter is freeboard. Freeboard is defined as the vertical distance between the water surface and either the top of bank or levee, or bridge soffit. Following are the District's general engineering guidelines for freeboard:

1. Under new bridges; freeboard is the same as the upstream or downstream channel.

2. Channels with earth levees; minimum freeboard is three feet, with an additional foot within 100 feet of bridges or other constrictions.
3. Channels with concrete floodwalls; minimum freeboard is two feet.
4. Natural channels without levees; minimum freeboard is one foot or, two tenths the energy, whichever is greater.

Design Water Surface Elevation in Flood Basin

The controlling downstream water surface elevation used in the design of Matadero Creek is based upon the hydrology of the creeks that flow into the Palo Alto Flood Basin, the hydraulics of the basin and tide gates, and the tidal cycle in San Francisco Bay. Two different conditions have been evaluated as part of the design criteria for Matadero Creek. These conditions consider the effects of: (1) the maximum water surface elevation in the flood basin that is reached during a one percent flood and (2) the one percent peak flow rate in Matadero Creek. These conditions were evaluated separately because they do not occur at the same point in time. The analysis is explained in Appendix G of this report.

Design Constraints

The study area can be subdivided into two general regions: 1) the flood basin to El Camino Real and 2) El Camino Real to Foothill Expressway. The downstream portion of the Matadero Creek study area is entirely a man-made channel because the natural creek historically did not extend beyond about Alma Street. Upstream of El Camino Real the creek is mostly a natural stream.

Because of the marked difference in the nature of the existing Matadero Creek channel, the constraints of alternative designs are also very different. Land subsidence in the downstream reaches of both Matadero and Barron Creeks has created a situation where design water surface elevations in the channel can be up to two feet above adjacent ground during flood stage (see Appendix H). Under this type of condition, providing freeboard between the design water surface and the soffit of the proposed bridges would cause significant impacts to the road grade, curbs, gutters, sidewalks, driveways and front yards. For example at Greer Road, the road grade would have to be raised about four feet and would impact yards and sidewalks for about 200 feet each side of the creek. Impacts to yards and drainage would be so serious as to make this type of design infeasible. As a result, some bridges in the lower reaches must flow under submerged conditions during flood stage in order to retain road grades nearly equal to those existing at the bridges.

Where it becomes necessary to allow bridges to operate under submerged conditions during flood stage, levees or floodwalls will be designed to contain floodwaters using freeboard requirements consistent with FEMA criteria. Bridges will be designed to resist buoyant forces due to submergence.

Description of Conceptual Solutions

Several conceptual alternative solutions have been studied for Matadero and Barron Creeks. Because the nature of the existing problems and constraints vary significantly for the different reaches of the study area, so do the possible solutions. Following are the various alternatives, beginning with the "no project" alternative which applies to the entire study area. An alternative for the diversion of flows from Barron Creek into Matadero Creek has been developed.

"No Project" Alternative

Under this option the District would not take any direct action through the construction of flood control measures to reduce the current flood damage potential. Residents and businesses would continue to face potential hardship and possible loss of life due to flooding. Overall, the combined Barron-Matadero one percent flood damage potential exceeds $28 million and long term average annual flood damages of $1.2 million per year could be expected.

TABLE 6
MATADERO & BARRON CREEKS PLANNING STUDY
COMPARATIVE SUMMARY OF FEASIBLE ALTERNATIVES

7/29/87

MATADERO CREEK: PALO ALTO FLOOD BASIN TO EL CAMINO REAL

ISSUES & CONCERNS	FLOODWALL ADDITION	FLOODWALL ADDITION & BRIDGE REPLACEMENT	CHANNEL REPLACEMENT & BRIDGE REPLACEMENT	PROPOSED PROJECT *
(1) PROJECT COST				
(A) Right-Of-Way	$0.0 million	$0.0 million	$ 0.2 million	$ 0.0 million
(B) Construction	$4.5 million	$8.0 million	$13.0 million	$10.0 million
(C) Mitigation	$0.0 million	$0.0 million	$ 0.0 million	$ 0.0 million
(D) Total Cost	$4.5 million	$8.0 million	$13.0 million	$10.0 million
(2) PHYSICAL ENVIRONMENT				
(A) General Description	Concrete floodwalls up to 6 feet high will be added along banks of existing concrete channel. All existing bridges will remain.	Replace 9 existing bridges, add floodwalls 2 to 3 feet high, realign channel between Alma Street and Park Blvd.	Replace 9 existing bridges and replace existing concrete trapezoidal channel with a larger concrete rectangular channel.	Replace 9 existing bridges, add floodwalls 2 to 3 feet high, replace channel from Alma Street to El Camino Real.
(B) Local Drainage	Severely impacted local storm drainage because of high water levels relative to adjacent ground.	Local storm drains slightly affected during high flows because of higher water levels in channel.	Local storm drainage improved because of lowered water levels with larger channel.	No significant change in local storm drainage. Access to channel improved in most areas, slightly worsened in others.
(C) Maintenance	Access to channel precluded because of extremely high floodwalls.	Access to channel slightly more difficult because of floodwalls	Improved access to and along new larger channel.	Access to channel more difficult where floodwalls are added.
(D) Roads & Bridges	No Impact to roads or bridges.	Most existing bridges to be replaced. Alma Street bridge to remain, Park Blvd bridge raised 1.5 ft.	Most existing bridges to be replaced. Alma Street bridge to remain, Park Blvd bridge raised 1.5 ft.	Most existing bridges to be replaced. Alma Street bridge to remain, Park Blvd bridge raised 1.5 ft.
(E) Utilities	Little or no impact to existing utilities.	Utilities at bridges will be relocated.	Utilities at bridges will be relocated. New outfalls along area of channel replacement.	Utilities at bridges will be relocated. New outfalls along area of channel replacement.
(F) Traffic	No significant impact to traffic flow.	Traffic control required for all bridge construction.	Traffic control required for all bridge construction.	Traffic control required for all bridge construction.
(G) Right of Way	No additional right of way required.	No additional right of way required.	Additional right of way required near SPRR.	Additional right of way required near SPRR.

TABLE 7
MATADERO & BARRON CREEKS PLANNING STUDY
COMPARATIVE SUMMARY OF FEASIBLE ALTERNATIVES

PRELIMINARY, 11/05/87
MAT.AltMatrix1

MATADERO CREEK: EL CAMINO REAL TO BOL PARK

ISSUES & CONCERNS	FLOODWALL ADDITION W/ CHANNEL CLEARING	EXCAVATED EARTH CHANNEL	CONCRETE LINED CHANNEL	UNDERGROUND HIGH FLOW BYPASS CHANNEL
(1) PROJECT COST				
(A) Right-Of-Way	$0.5 million	$3.5 million	$0.1 million	$0.0 million
(B) Construction	$3.3 million	$2.8 million	$3.5 million	$6.5 million
(C) Mitigation	$2.9 million	$2.9 million	$5.0 million	$0.0 million
(D) Total Cost	$6.7 million	$9.2 million	$8.6 million	$6.5 million
(2) PHYSICAL ENVIRONMENT				
(A) General Description	Concrete floodwalls up to 10 feet high will be added along banks of existing natural creek. Trees removed from channel and both *banks. Land purchase* required to mitigate.	Excavate one bank and construct earth bench. Trees and vegetation on one bank to be removed. Land purchase required to mitigate *vegetation loss.*	Excavate natural creek, remove all vegetation, construct a concrete lined channel. Land purchase required to mitigate *vegetation loss.*	Natural creek to remain as is and carry low flows. High flows would be conveyed by an underground bypass channel. Mitigate by replanting vegetation.
(B) Local Drainage	Local storm drains severely impacted because of high water levels relative to adjacent ground.	Local storm drainage improved because of lowered water levels with larger channel.	Local storm drainage improved because of lowered water levels with larger channel.	Local storm drainage improved because of lowered water levels with high flow bypass channel.
(C) Maintenance	Access to channel precluded because of continuous concrete floodwalls.	Access to channel slightly improved because of larger channel.	Improved access to and along new concrete lined channel.	Access to natural creek unchanged. Access to bypass at intake & outlet only.
(D) Environmental Impacts	All trees within channel to be removed. About 2.5 acres impacted.	Complete removal of vegetation on one bank; about 3.5 acres impacted.	Complete removal of all vegetation along natural creek; about 4.0 acres impacted.	No impact to natural creek. Removal of vegetation in portions of Bol Park and Stanford Channel R/W.
(E) Traffic	No significant impact to traffic flow.	Traffic control required for all *bridge construction.*	Traffic control required for all *bridge construction.*	Bike path detour required during construction.
(F) Right of Way	Setbacks of 5' to 10' required for top of bank floodwall. Nearly all yards affected.	Average excavation of 15' beyond exist bank; acqusition of 7 homes.	No additional right of way required except in existing creek.	Easement required through Bol Park and Varian parking lot.

PRELIMINARY 11/05/87
BARRON.AltMatrix

TABLE 8
MATADERO & BARRON CREEKS PLANNING STUDY
COMPARATIVE SUMMARY OF FEASIBLE ALTERNATIVES

BARRON CREEK: LOUIS ROAD TO FOOTHILL EXPRESSWAY

ISSUES & CONCERNS	FLOODWALL ADDITION	FLOODWALL ADDITION & BRIDGE REPLACEMENT	CHANNEL REPLACEMENT & BRIDGE REPLACEMENT	UNDERGROUND HIGH FLOW DIVERSION CHANNEL
(1) PROJECT COST				
(A) Right-Of-Way	$0.0 million	$ 0.0 million	$ 0.1 million	$0.0 million
(B) Construction	$5.0 million	$10.0 million	$13.0 million	$2.4 million
(C) Mitigation	$0.0 million	$ 0.0 million	$ 0.0 million	$1.1 million
(D) Total Cost	$5.0 million	$10.0 million	$13.0 million	$3.5 million
(2) PHYSICAL ENVIRONMENT				
(A) General Description	Concrete floodwalls 3 to 4 feet high will be added along banks of existing concrete channel. All existing bridges will remain. New Los Robles culvert	Replace and raise 11 existing bridges, add floodwalls 2 to 3 feet high, add parallel culvert down Los Robles Avenue.	Replace 11 existing bridges and existing concrete trapezoidal channel. Add parallel culvert down Los Robles Avenue.	Construct high flow diversion from Barron to Matadero system. Mitigate by providing incremental capacity to Matadero Creek.
(B) Local Drainage	Local storm drains severely impacted because of high water levels relative to adjacent ground.	Local storm drains slightly worsened during high flows because of higher water levels in channel.	Local storm drainage improved because of lowered water levels with larger channel.	Local storm drainage improved upstream of Louis Road because of decreased backwater at bridges.
(C) Maintenance	Very difficult access to channel because of high floodwalls.	Access to channel slightly more difficult because of floodwalls	Improved access to and along new larger channel.	Access to channel unchanged.
(D) Roads & Bridges	No impact to roads or bridges.	Eleven existing bridges to be replaced. Eight will be raised 1′ to 2′.	All existing bridges to be replaced. None will need to be raised.	No impact to roads or bridges. Detour route required for bike path.
(E) Utilities	Little or no impact to existing utilities.	Utilities at bridges will be relocated.	Utilities at bridges will be relocated. New outfalls along area of channel replacement.	Little or no impact to existing utilities.
(F) Traffic	Substantial impact due to construction down Los Robles Avenue.	Substantial impact due to construction down Los Robles Avenue.	Substantial impact due to construction down Los Robles Avenue.	Bike path detour required during construction.
(G) Right of Way	No additional right of way required.	No additional right of way required.	No additional right of way required.	Easement required along proposed diversion channel.

On the average, some minor flooding could be expected to occur on Matadero Creek about once every 15 years. Average annual flood damage would be about $653,000 per year over the long term. The District would continue its ongoing program of debris and sediment removal, erosion repair, right of way acquisition and weed control. Maintenance costs on Matadero Creek could be expected to average about $65,000 per year and increase as additional right of way is acquired.

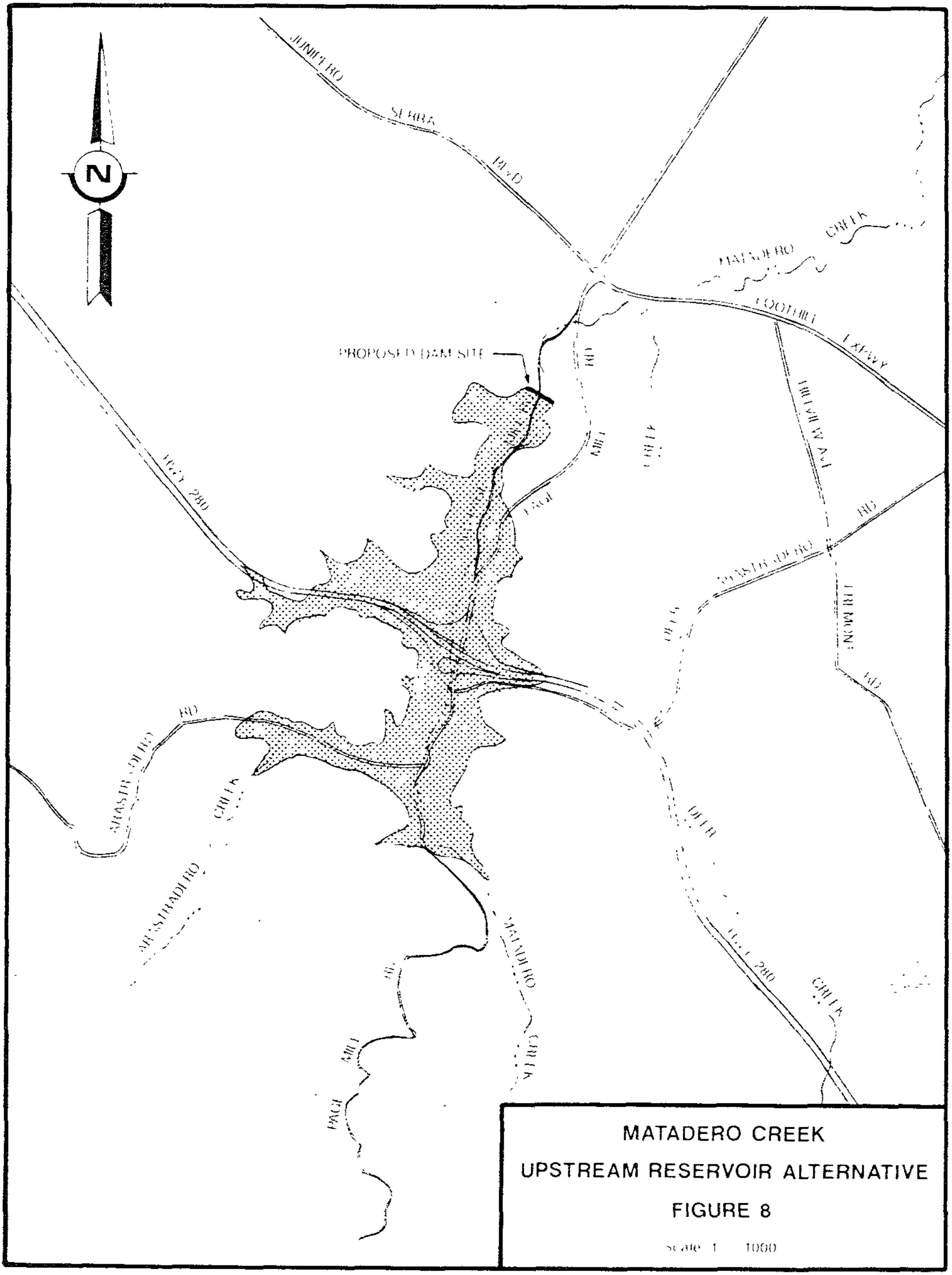
On Barron Creek some minor flooding could be expected about once every three or four years. Average annual flood damages due to Barron Creek would be about $640,000 per year. The District's ongoing program of maintenance would be continued at an estimated cost of $50,000 per year.

Matadero Creek Alternative Solutions:

1. Upstream Storage Alternative

This alternative would consist of building an upstream flood control reservoir on Matadero Creek designed to reduce the one percent peak flow rate to an amount that could safely pass through the existing system of channels, culverts, and bridges. To accomplish this objective the peak one percent flow rate at Laguna Avenue would need to be reduced from 2,200 cfs to 1,300 cfs. A flood storage capacity of at least 300 acre-feet would be needed to reduce the peak flow rate.

The reservoir feasibility study (7) completed by Harry Jenks, consulting engineer, for the District in 1957 investigated a proposal to build a 240 acre-foot water supply reservoir on Matadero Creek just upstream of Foothill Expressway. Because of the high cost of land acquisition the concept was not feasible and was abandoned. Since 1957 land values have escalated and the watershed has been heavily developed, including construction of interstate 280, clearly making the upstream reservoir alternative infeasible. A map indicating the reservoir location is shown in Figure 8.



MATADERO CREEK

UPSTREAM RESERVOIR ALTERNATIVE

FIGURE 8

scale 1 1000

Matadero Creek: El Camino Real to Bol Park

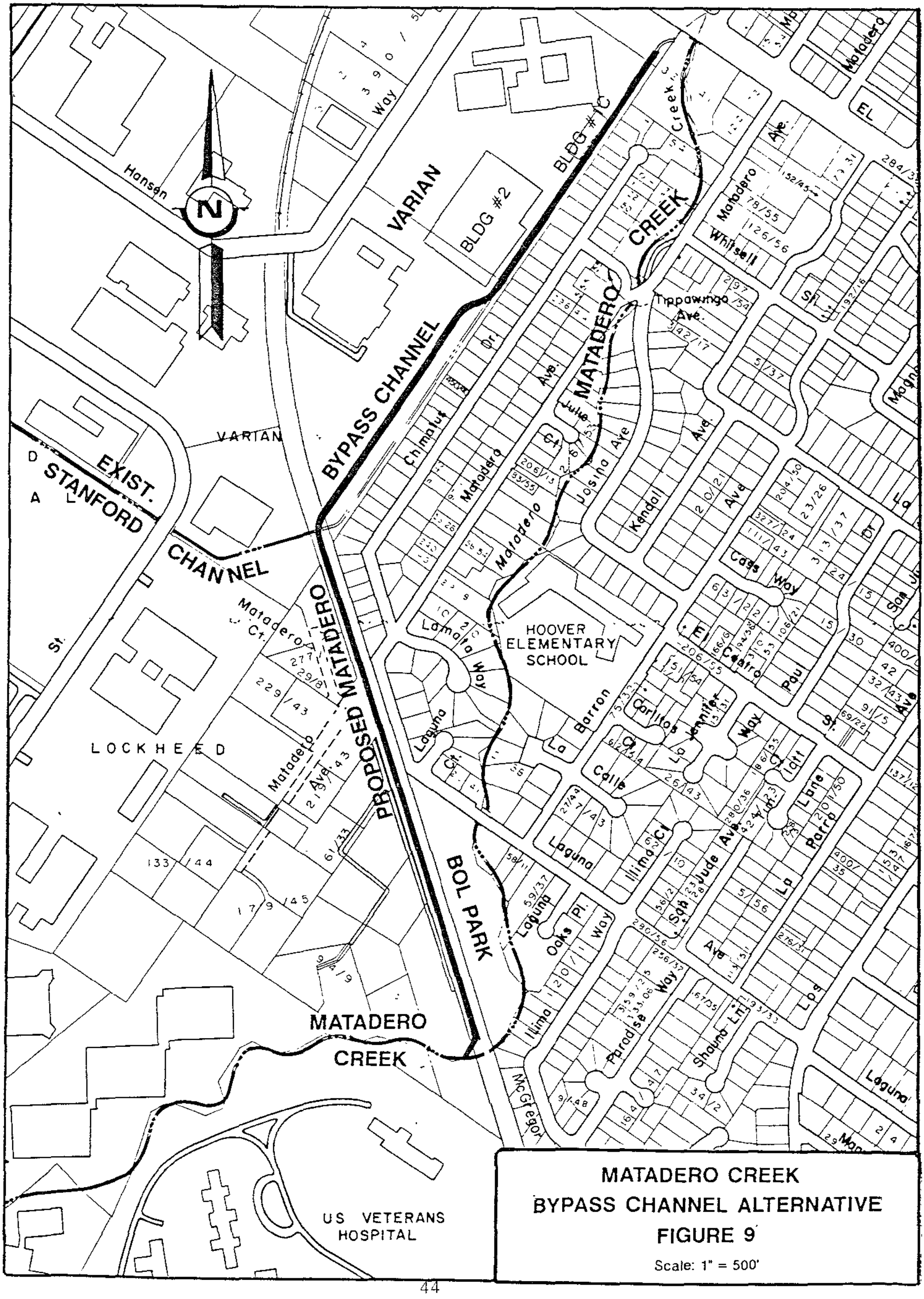
1. Bypass Channel Alternative

The concept of this alternative is to divert a portion of the peak flood flow from Matadero Creek into an auxiliary high flow channel that would bypass the inadequate existing creek channel. A bypass channel is only proposed between the old SPRR right of way (near Bol Park) and El Camino Real. The bank full flood carrying capacity of the natural stream channel is only about 1,500 cfs while the 1% design flow rate is 2,200 cfs (2,800 cfs if Barron Creek high flows are diverted). If 900 cfs were carried by a bypass channel the remaining 1,300 cfs could safely pass through the natural stream channel with freeboard.

The bypass channel would carry the 900 cfs from Matadero Creek through an underground culvert that would follow the 80-foot wide old SPRR right of way where the City's bike path now exists. The Stanford Channel 84-inch pipe would outfall into the proposed box culvert at the southwesterly corner of the Varian site. The underground bypass culvert would then follow below Varian's parking lot northerly of the Stanford Channel right of way for 1,100 feet. Near Varian's Building 2, the bypass channel would curve into the District's existing 50-foot wide Stanford Channel right of way and follow this alignment downstream to El Camino Real.

This alternative would solve flood problems on Matadero Creek between El Camino Real and the old SPRR bridge. It also has the potential to be slightly larger and carry additional flows that could be diverted from Barron Creek (as explained in the diversion alternative for Barron Creek). Flood control measures would still be required downstream of El Camino Real.

The estimated cost of the bypass channel alternative between Bol Park and El Camino Real, is $6.5 million.



MATADERO CREEK
BYPASS CHANNEL ALTERNATIVE
FIGURE 9

Scale: 1" = 500'

2. Floodwalls with Selective Clearing

With this alternative, the existing natural channel would be modified to carry the design flood flow with freeboard. Containment of the floodwaters would be accomplished by selectively removing major obstructions and constrictions from the channel and adding concrete floodwalls along the banks.

For the option to carry only Matadero flood flows (2,200 cfs), the proposed height of the floodwalls would vary from a minimum of three feet to a maximum of nine feet above the top of the existing natural creek banks. Trees would be removed from the natural creek channel and vegetation would be cleared from the banks to allow construction of the concrete floodwall. For the option to carry Matadero flood flows and diverted Barron Creek high flows (2,800 cfs), the floodwall height would vary from five feet to 12 feet above the top of the existing creek banks.

A minimum setback of about five feet would be required between the proposed floodwall and the existing creek bank to provide stability for the wall. Between El Camino Real and Matadero Avenue, this would require raising five existing private bridges and driveways, and one pedestrian bridge and would cause the loss of all mature oak trees growing within the channel. Between Matadero Avenue and Laguna Avenue many more oak trees would be removed and backyards of several homes would be adversely impacted by construction of the concrete floodwall. On the average, five to ten feet would be needed from backyards of adjacent homes. The Laguna Avenue bridge and the channel downstream for about 200 feet are very narrow and cause several feet of backwater upstream in Bol Park. To reduce the backwater and high flow velocities, this stretch of channel should be widened and stabilized with rock and stepped gabions. The stepped gabions would be required because of the steep banks.

Through Bol Park, the proposed measures would include constructing either a concrete floodwall or earth levees about two to three feet high. Because of right of way restrictions on the residential side of the creek, floodwalls would likely be used. To preserve the natural feeling of the park setting, earth levees would be most appropriate on that side of the creek. At the upstream end of this reach, the existing gunite bank protection would be removed and replaced with gabions.

In addition to constructing floodwalls and levees, various locations would also require rock and gabion lining because of high flow velocities. The long-term maintenance program would include close monitoring of erosion problems because the higher flows would result in more frequent and higher velocities.

If the proposed measures are designed to convey only the one percent flow rate of Matadero Creek (2,200 cfs), the average floodwall height would be four feet. If high flows from Barron Creek (600 cfs) are also diverted into the Matadero system via the Barron Diversion, the average floodwall height would be six feet. The estimated cost of the measures to provide one percent capacity on Matadero only is $6.7 million. The estimated cost to provide one percent capacity on Matadero and accommodate diverted flows from Barron Creek is $7.2 million.

3. Widened Earth Channel

With this alternative, the natural creek would be widened on one bank to provide capacity to safely carry the design flood with freeboard. The amount of excavation would vary from a width of ten to 25 feet, depending on location. Gabion and rock lining would be required to protect the excavated bank from erosion due to high flow velocities and channel bends.

For the option to carry only Matadero flood flows (2,200 cfs), the amount of channel widening would vary from about eight to 20 feet beyond the existing top of bank for the reach from El Camino Real to Matadero Avenue. The channel widening would also require replacement of five existing private bridges and the removal of about half of one existing building at the Creekside (formerly Flamingo) Motel. All vegetation along the excavated bank would be removed. To mitigate for this loss, revegetation of the upper banks and some adjacent lands would be undertaken.

Between Matadero Avenue and Laguna Avenue, the amount of channel widening varies from two to 25 feet. Because of width limitations, six existing homes would be purchased and removed to allow for the widening. Excavated banks would be lined with rock or gabions in areas subject to erosion potential. A new bridge would be constructed at Laguna Avenue.

Upstream of Laguna Avenue, the channel generally has greater flow carrying capacity and the amount of widening decreases to almost none.

For the option to carry Matadero Creek flood flows and diverted Barron Creek high flows (2,800 cfs), the amount of proposed channel widening would average five feet more than that for Matadero Creek only. Impacts to adjacent homes and riparian vegetation would be similar to the "Matadero only" alternative.

The estimated channel for Matadero widened earth channel for Matadero alone is $9.2 million. The cost for the Matadero and Barron diverted flows option is estimated at $10.0 million.

Matadero Creek: Palo Alto Flood Basin to El Camino Real

1. Floodwall Addition Alternative

The modifications required with this alternative include the addition of concrete floodwalls of varying height continuously along the existing concrete channel. The required height of the floodwalls varies according to the capacity of the existing channel and culverts. The channel generally has greater capacity than the culverts so the culverts would flow under pressure and require floodwalls with heights between four and seven feet. Local drainage would be severely impacted because of high water levels and maintenance access would be precluded.

The estimated cost of this alternative is $5.0 million. It was eliminated from further consideration because of the extreme height of floodwalls that would be required and the adverse impact to drainage systems.

2. Floodwall Addition with Culvert Replacement

This alternative would include the replacement of culverts at Greer, Louis, Ross, Middlefield, Cowper, Waverly, Park and Lambert Streets with larger clear-span bridges. Channel sections below the new bridges would conform with the existing concrete channel. Floodwalls averaging two feet high downstream of Cowper Avenue and three feet high between Cowper Avenue and El Camino Real would be needed. Raising of the existing road grades by about two feet would still be necessary at Cowper and Waverly with this alternative. Measures identical to the floodwall addition alternative would be required upstream of El Camino Real.

The estimated cost of this alternative is $8 million.

3. Floodwall Addition with Culvert and Channel Replacement

The objective of this alternative is to provide greater flood carrying capacity by replacing the existing channel and culverts downstream of El Camino Real. An advantage of using the channel replacement concept is that it not only improves local drainage but also eliminates the need to raise road grades at bridges. Additional advantages of this alternative would be its ability to easily handle diverted flows from Barron Creek and the ease and economy of the long-term maintenance program.

The portion of existing concrete-lined channel that would be replaced extends from Louis Road to El Camino Real. By replacing the existing channel with a larger one, the water surface can be lowered, floodwalls and road raising can be avoided and additional flow capacity included to handle the fully diverted Barron Creek flows. The flow conditions in the vicinity of SPRR and Alma Street can be greatly improved. Additionally, a costly sho-fly for the railroad might be avoided if it is possible to bore and jack a culvert under the railroad. This alternative could work in conjunction with either the bypass or floodwall alternative upstream of El Camino Real.

The estimated cost of this alternative, downstream of El Camino Real, is about $13 million. If the bypass alternative were used upstream of El Camino Real, the total estimated project cost would be about $17.5 million. If the Barron Creek diversion option is also included, the total project cost would be $21 million.

Barron Creek Alternative Solutions:

1. Floodwalls and Culvert Replacement

This alternative concept is similar to the same on Matadero Creek. The existing concrete-lined channel downstream of El Camino Real would be utilized and floodwalls would be added. Several inadequate culverts would be replaced and the average height of floodwalls would be about two feet. Eight of the eleven bridges that cross Barron Creek would have to be raised to allow passage of floodwaters. The amount of raising varies from one to two and a half feet and would impact may adjacent sidewalks, curbs, gutters and driveways.

Between El Camino Real and Laguna Avenue, the existing creek runs through a 66-inch diameter concrete pipe below Los Robles Avenue and has capacity to carry only about 180 cfs compared to the 1% design flow rate of 800 cfs. Upstream of Laguna Avenue, the creek becomes a semi-natural open channel with a capacity of about 400 cfs. To provide for the 1% flow rate of 800 cfs, a parallel five by eight-foot box culvert running below Los Robles Avenue would be constructed from the downstream end of Gunn High School to El Camino Real. Construction of the culvert would disrupt traffic and impact many existing utilities such as sewer, water and gas lines. The culvert would be difficult to maintain because of its relatively small size and poor access.

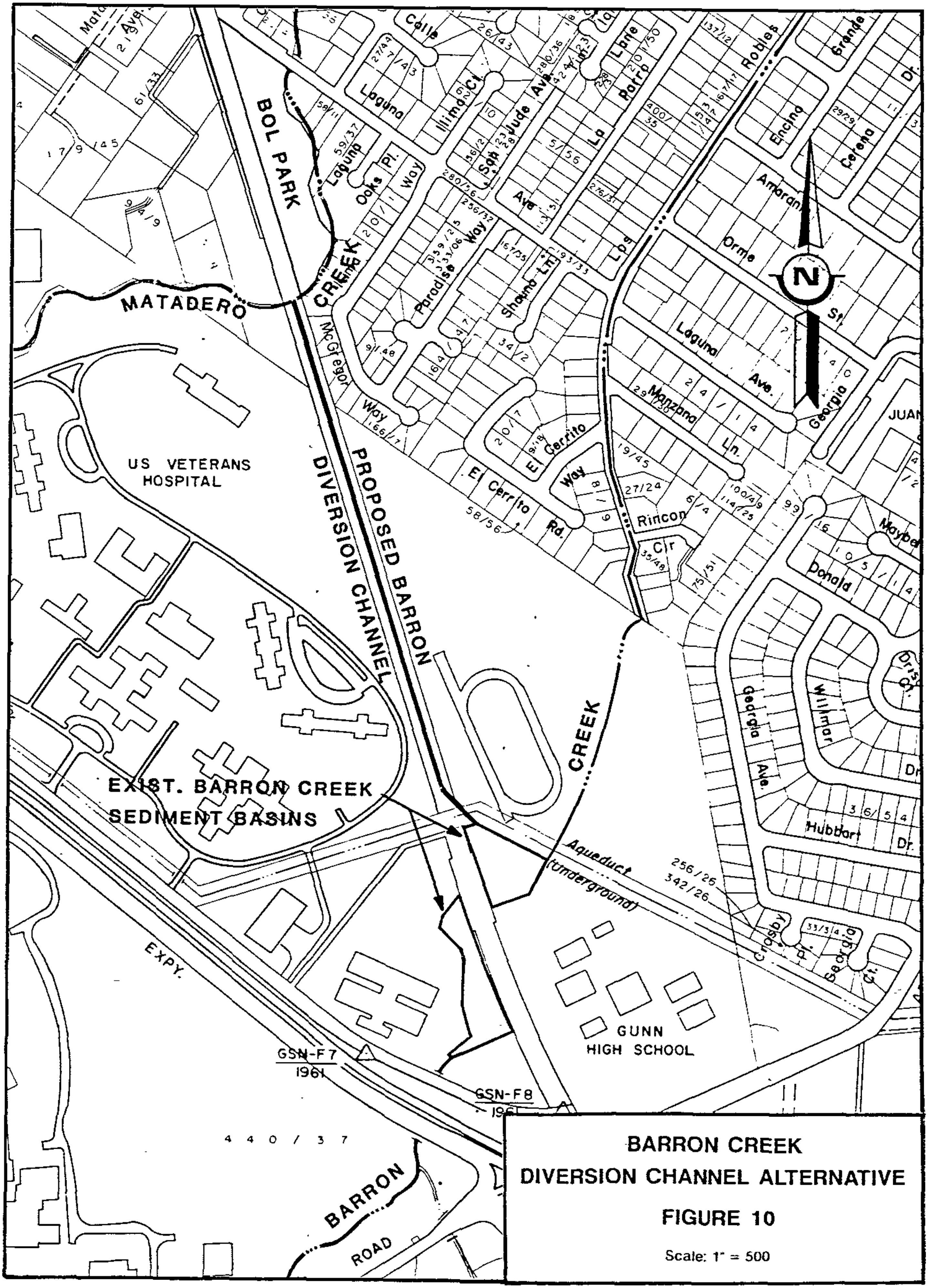
Through Gunn High School, the existing high flow swale would need to be excavated larger so that it would contain the 1% flood. Because the existing pipe across Gunn High School has capacity for only 200 cfs, the swale would need to carry 600 cfs. The total estimated cost of this alternative is $10 million.

2. Diversion Channel Alternative

This alternative is designed to work in conjunction with associated improvements to Matadero Creek. Because Matadero and Barron Creeks are similar and parallel flood carrying systems with overlapping floodplains, the benefits of enlarging one system can be greatly increased by carrying a portion of the other creek's flow. More specifically, Matadero Creek is inadequate along nearly all its length from the flood basin to the old SPRR bridge near Bol Park and will require major modifications to safely convey its 1% design flow rate. Barron Creek is also inadequate along its entire length between Gunn High School and the flood basin. Because the Matadero watershed is significantly larger than the Barron watershed (5.5 versus 1.3 square miles upstream of Foothill Expressway) the greatest advantage can be realized by diverting Barron Creek high flows into Matadero Creek.

The 1% design flow rate of Matadero Creek at Bayshore Freeway is 2,900 cfs whereas Barron Creek is only 800 cfs. The minimum existing flow carrying capacity of Barron Creek (between Laguna Avenue and El Camino Real) is 180 cfs. Therefore, if the Barron Creek flow rate were to be reduced by about 600 cfs, flooding on Barron Creek would be eliminated up through the 1% event. By providing an additional 600 cfs capacity along Matadero Creek, the flood carrying systems could be economically optimized, the solution of the flooding problems accelerated in time and a signficant amount of construction impact to the roads and adjacent communities along Barron Creek avoided.

The beginning of the proposed diversion would be located near Gunn High School at the Barron Creek sediment basins as shown in Figure 10. An inlet structure would be provided at the basin to carry 600 cfs of the one percent flow rate of 760 cfs. All flows up to 160 cfs would continue to flow out of the basin and down Barron Creek. The diversion channel would be located underground within the 80-foot wide old SPRR right of way (owned by Stanford and leased to the City of Palo Alto). Flood flows would be carried through the diversion culvert to the proposed Matadero Bypass. Because the diversion channel would be an underground culvert, it would not be visible except at its inlet. A maintenance access ramp would be located at the entrance to the diversion and



BARRON CREEK
DIVERSION CHANNEL ALTERNATIVE

FIGURE 10

Scale: 1" = 500

would utilize the District's existing ingress-egress easement to the Barron sediment basin. The sediment basin levees would be raised two feet and a concrete floodwall would be added to the upper basin along the Fairchild parking lot.

The Barron Creek diversion channel alternative would work most effectively in conjunction with the bypass alternative for Matadero Creek. This is because the Barron diversion flows could be combined with the Matadero bypass flows and carried around the natural stream via the underground culvert.

Downstream of El Camino Real, the addition of 600 cfs into Matadero Creek would increase the design water surface by one-half to eight-tenths of a foot during a one percent flood and would not significantly change those flood control measures that would be required for Matadero Creek alone.

The estimated cost to build the actual Barron Creek to Matadero Creek diversion channel is $2.1 million. The marginal cost for providing incremental capacity for the Matadero bypass and Matadero channel downstream of El Camino Real is about $1.5 million. Therefore, the estimated total cost of the Matadero and Barron Creeks measures is $21 million.

Project Selection

The conceptual alternatives were compared and evaluated considering their advantages and disadvantages. Factors considered in the evaluation include impact to homes, businesses, the overall community and the natural environment, construction cost, maintenance aspects and effects on traffic and the community during construction. Each of the feasible alternatives is summarized in Table 6.

Matadero Creek

The preferred alternative and recommended plan is a combination of different design options. From Bayshore Freeway to Cowper Street, the suggested plan for Matadero Creek is the "Floodwall Addition with Culvert Replacement" alternative. This alternative provides the best balance between cost effectiveness and impacts to the community. The plan would avoid the problems of raising existing bridges and road grades but would do so without the high cost of the full channel replacement alternative. Existing channel capacity is nearly sufficient in this part of the study area so that the proposed floodwall would be an average of two feet above the top of the existing banks. The "Floodwall Addition" alternative (without culvert replacement) would have required floodwalls four to five feet high, which is generally viewed as having a negative impact. For the above reasons, the "Floodwall Addition with Culvert Replacement" alternative was selected between Bayshore Freeway and Cowper Street for Matadero Creek.

Between Cowper Street and Waverly Street, the suggested plan is "Floodwall Addition with Culvert and Channel Replacement" because the existing channel does not have sufficient capacity to avoid raising the bridges and road grades at Cowper and Waverly Streets. The new channel section would be identical to the existing channel downstream of Cowper Street and would not require road raising.

From Waverly Street to Alma Street, the suggested plan is "Floodwall Addition" because the existing channel is nearly adequate and would require floodwalls only about one foot higher than the top of the existing bank. This is both the least costly and least disruptive plan.

The suggested plan between Alma Street and El Camino Real is "Channel and Culvert Replacement" because the existing system is severely inadequate and has problems due to its alignment. The new channel section and alignment would eliminate the abrupt turns in the channel near Southern Pacific Railroad and reduce the backwater created by the inadequate culverts at SPRR, Park and Lambert. This is a costly design alternative but is the only way to eliminate existing flooding and also be compatible with the preferred plan upstream of El Camino Real.

Between El Camino Real and Bol Park, the suggested plan is the "Bypass Channel". This alternative is the least costly plan and received strong support from the community in earlier studies done in the late 1970s. The bypass alternative also avoids impact to the natural creek. It is the only plan that would be compatible with the "Barron Diversion" channel concept while not substantially disrupting the natural creek and adjacent homes. For these reasons, it is the selected alternative.

From Bol Park to Foothill Expressway, the proposed plan is a combination of erosion repair and right of way acquisition for maintenance. Because most of this land is currently owned by Stanford University, the District must first obtain dedication of a flood control and maintenance easement as well as ingress-egress easements through parking lots before any measures can be undertaken. Most of the existing natural channel is adequate to carry the one percent flood but is eroding and will require bank stabilization measures. The existing 12' by eight-foot underground box culvert below Watkins-Johnson does not have sufficient capacity and a parallel eight by eight-foot parallel culvert is proposed.

Barron Creek

The suggested plan for Barron Creek is the "Diversion Channel" alternative. This plan is the least costly alternative for Barron Creek and greatly increases the cost-effectiveness of the Matadero Creek measures that are proposed. It is also the alternative that causes the least amount of overall disruption to the community and the natural environment. Because of these clear advantages, it is the proposed plan for Barron Creek.

The proposed alignment of the diversion channel follows the existing 80-foot wide old SPRR right of way. Of the 2,000 feet of proposed diversion channel 400 feet are owned by the City of Palo Alto and 1,600 are owned by Stanford. An easement for flood control and maintenance purposes will be needed along this right of way. Bicycle and foot traffic will be detoured during construction as described in the following chapter.

Long-term maintenance will still be required along Barron Creek downstream of the diversion. The reach from Laguna Avenue to the Barron sediment basin is privately owned and flood control easement is proposed.

DESCRIPTION OF PROPOSED PROJECT

This chapter presents a detailed reach by reach description of the proposed flood control project. Descriptions of each reach, adjacent land use, right of way requirements and proposed project measures are included.

The project study area can be logically divided into three segments: 1) Matadero Creek from Palo Alto Flood Basin to El Camino Real, Reaches 1 through 6; 2) Matadero Creek from El Camino Real to Foothill Expressway, Reaches 7 through 11, and 3) Barron Creek diversion channel.

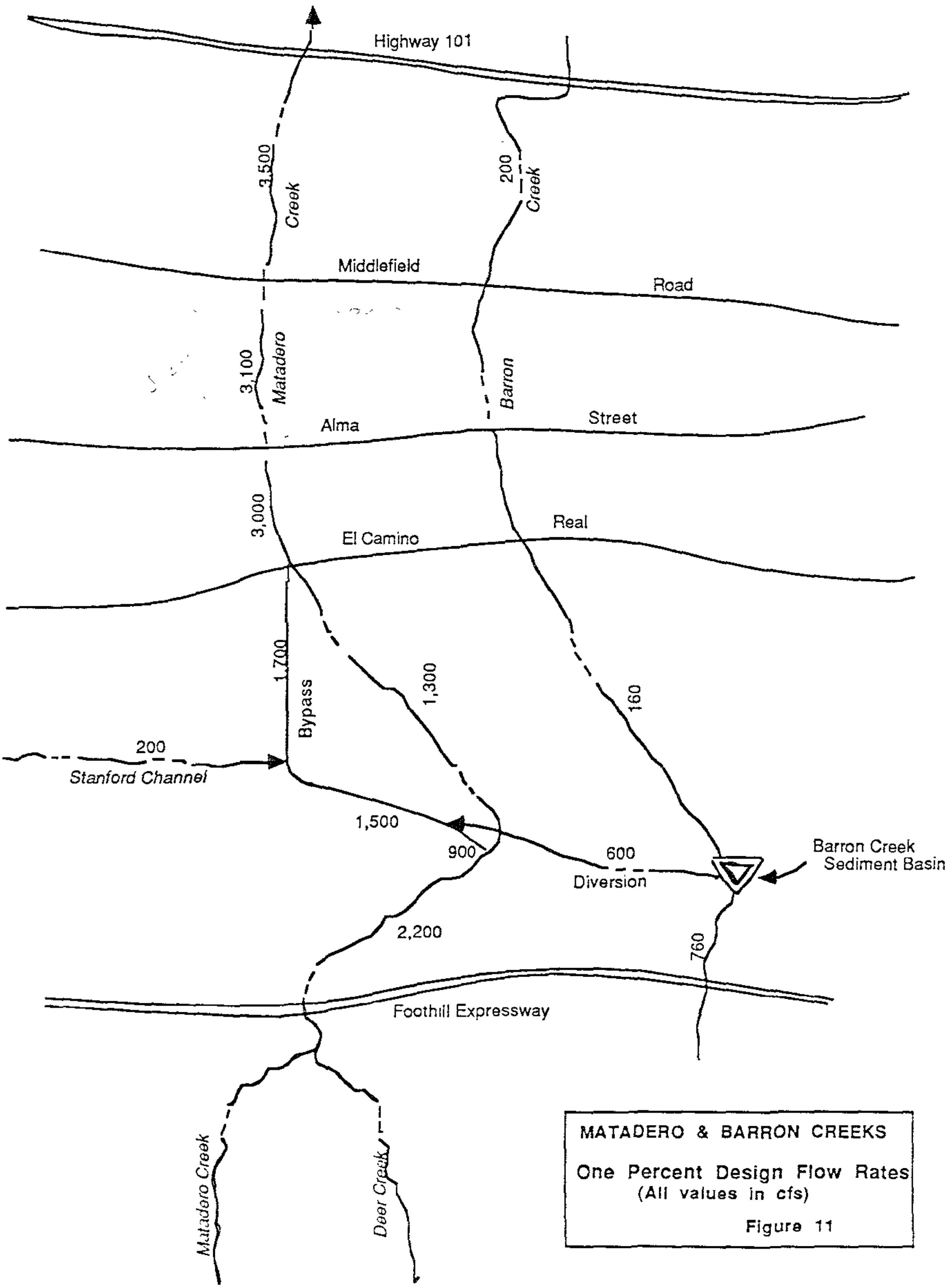
Proposed measures in Reaches 1 through 6 consist of floodwall addition, bridge replacement, and some channel replacement. New bridges will replace the existing inadequate culverts. Where feasible, floodwalls two to three feet high will be added to the top of the existing channel to provide the necessary freeboard required by FEMA design standards. Some portions of the existing concrete channel will be removed and replaced with a new channel section. Where a new channel is to be constructed a low flow channel for fish passage will be incorporated.

Where new bridges are proposed the existing road grades will be maintained where feasible. Where a new channel is proposed safety ladders, fencing, and maintenance access ramps will be provided periodically along the channel as shown in the plans.

Upstream of El Camino Real, the natural creek will remain essentially undisturbed and will continue to provide a significant amenity to the community and to wildlife. To avoid permanent impact to the natural environment and adjacent community, an underground bypass channel is proposed.

An underground diversion channel is proposed for Barron Creek that is designed to allow only the flow rate that can safely pass (160 cfs) through the existing downstream Barron channel system. Diverted high flows during the one percent peak flow (600 cfs) will be carried to the proposed Matadero bypass. The basis of design of the Barron Diversion Channel is further explained later in this chapter and in Appendix J. The 1% Design Flow Rates for the flood control system are shown in Figure 11.

PALO ALTO FLOOD BASIN



MATADERO & BARRON CREEKS

One Percent Design Flow Rates
(All values in cfs)

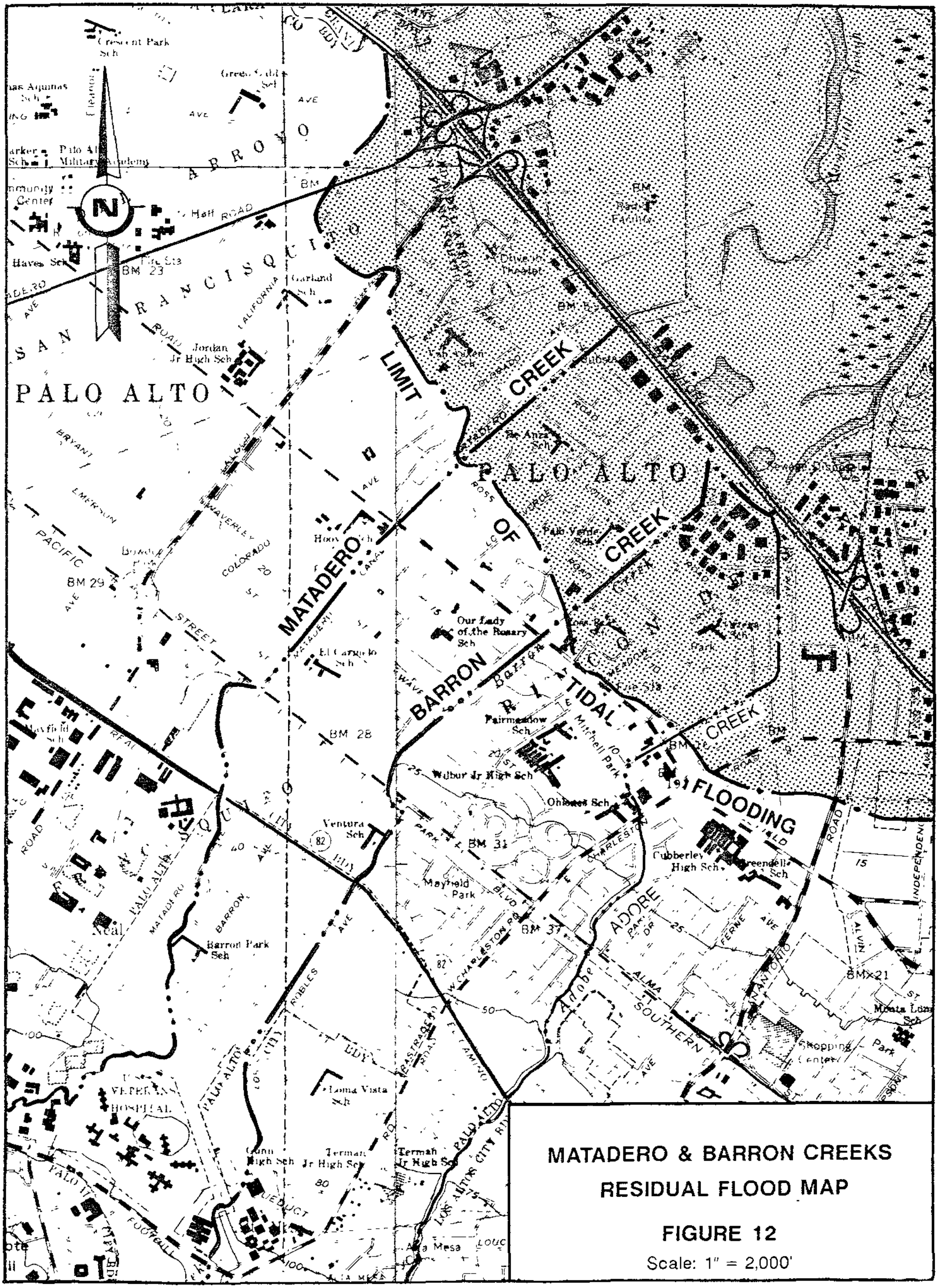
Figure 11

The floodplain that will remain due to saltwater flooding after construction of the proposed project is shown in Figure 12.

The proposed project will improve performance of local storm drains along Barron Creek because of the lower flow rates, and consequently, lower water surface. Local storm drainage will also be improved on Matadero Creek upstream of Alma Street. The proposed Bypass Channel, larger bridges, and larger channel will all contribute to a lower water surface.

Downstream of Alma Street on Matadero Creek there will be an increase in the maximum water surface. This increase is very slight (3 to 4 inches at a 10-year flood) and will not significantly impact overall storm drainage efficiency.

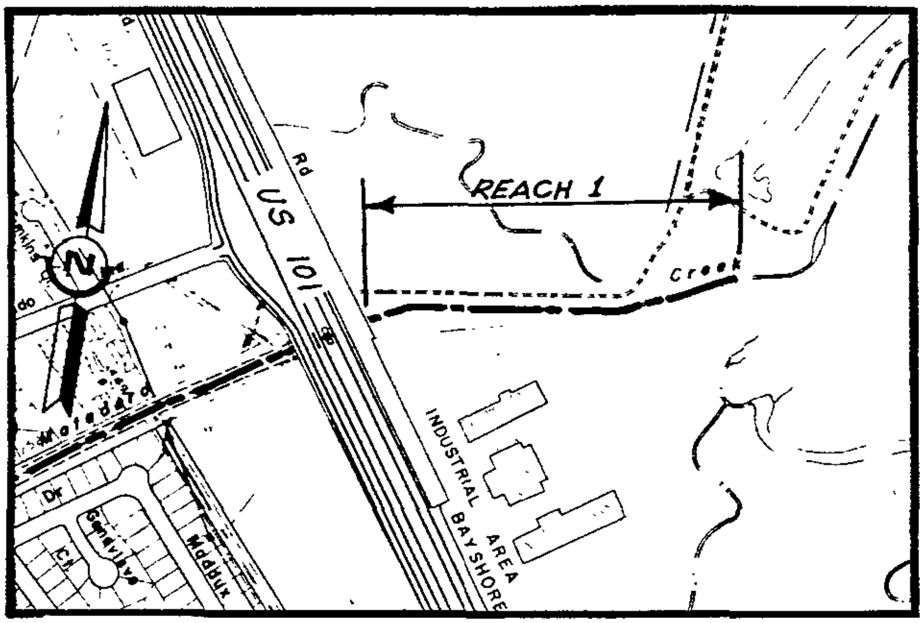
Following is a detailed description of the measures proposed for each reach. The estimated total cost for all measures proposed is $21 million.



MATADERO & BARRON CREEKS RESIDUAL FLOOD MAP

FIGURE 12

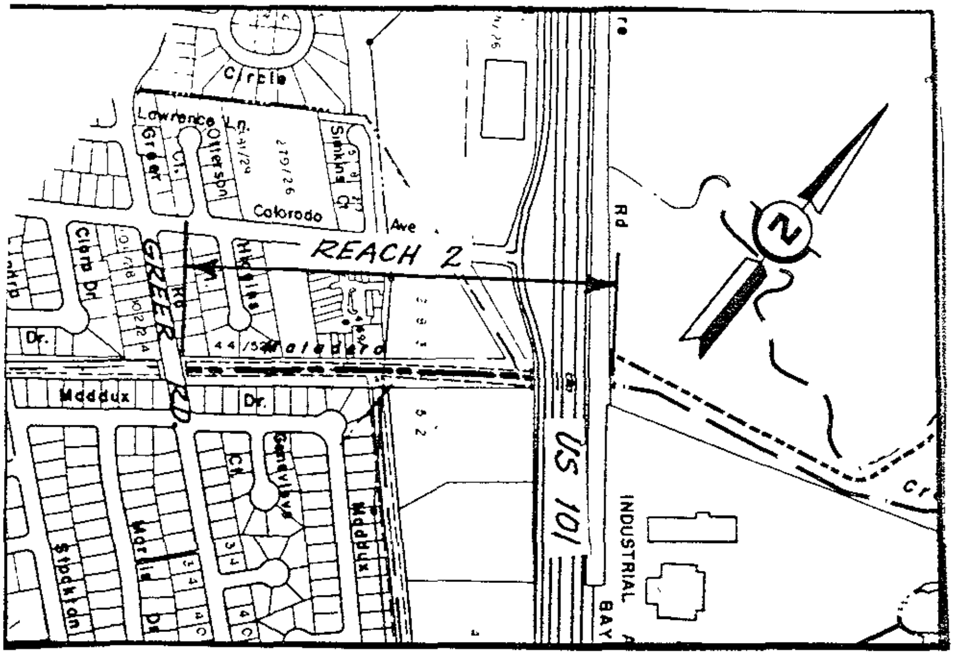
Scale: 1" = 2,000'



Reach 1: Matadero Creek - Palo Alto Flood Basin to Bayshore Freeway

Reach 1 extends from the Palo Alto Flood Basin to the downstream side of Bayshore Freeway, a total distance of about 1,000 feet. Flood control measures were constructed in this reach in 1986 as part of the Flood Basin project. The modifications consisted of raising the earth levee to elevation 6.1 feet NGVD along the north side of Matadero Creek and constructing a concrete floodwall to elevation 6.1 feet NGVD on the south side of Matadero Creek. The finished elevation of 6.1 was a compromise value agreed upon by the District and the City of Palo Alto after much discussion. The design has not been reviewed or approved by FEMA. Because the one percent design water surface elevation of the flood basin is 5.7 feet NGVD, (see Appendix G) only one-half foot of freeboard is provided. FEMA policy requires three feet of freeboard on earth levees such as on the northerly side of Matadero Creek downstream of Bayshore Freeway.

No construction measures are proposed in Reach 1 as part of the immediate Matadero Creek Project. The levee elevations will be increased in the future to conform to FEMA policy. This may not be necessary until the tidal flooding problem is solved.

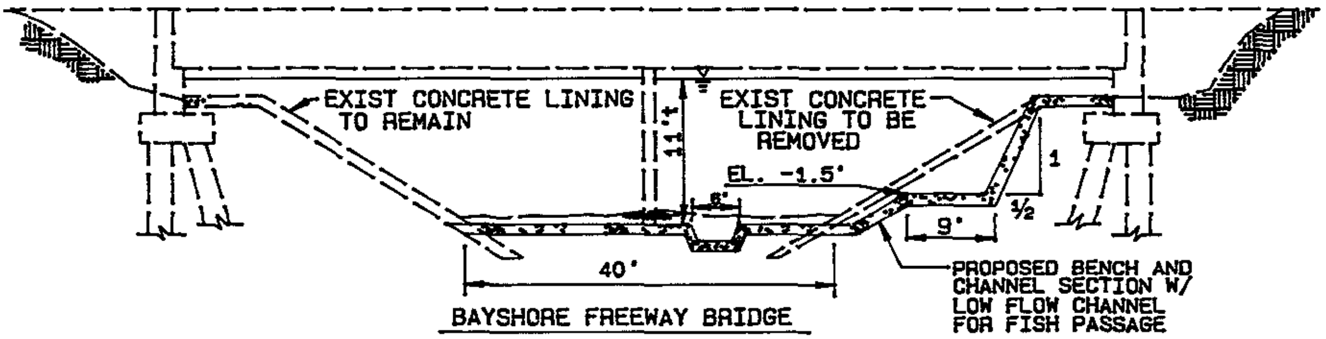


Reach 2: Matadero Creek - Bayshore Freeway to Greer Road

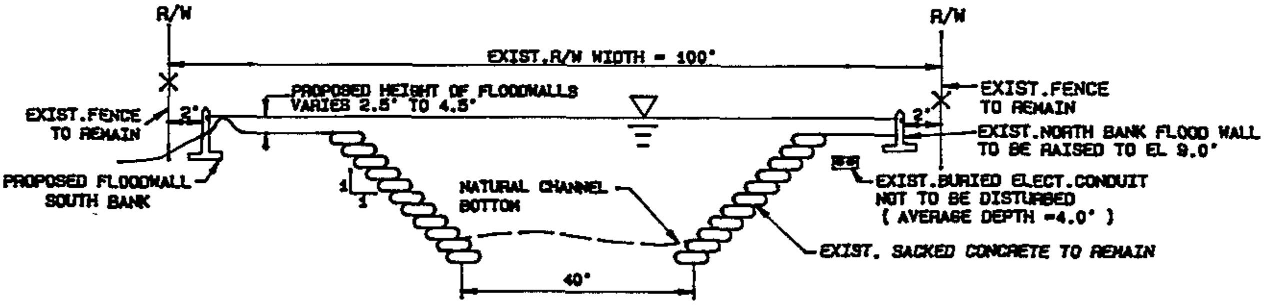
Reach 2 extends from the downstream side of Bayshore Freeway to the downstream side of Greer Road, a distance of about 1,500 feet. The proposed flood control measures consist of raising the existing north bank floodwall by about one foot and constructing a new concrete floodwall about three feet high on the south bank. The proposed floodwall will tie into the proposed Greer Road culvert headwall and will conform to the pumping station on the north bank. A ramp over the floodwall into the pumping station will be built.

An existing abutment from an abandoned pipe will be removed from the south bank across from the City's pumping station. The banks will be constructed to conform to the existing sacked concrete banks.

A maintenance ramp will be constructed on the southerly bank just upstream of Bayshore Freeway for access to the channel bottom. The channel bottom within the area below the Bayshore Freeway and the frontage road bridges will be concrete-lined to allow maintenance equipment to remove sediment and debris. A nine-foot wide bench and ramps will be constructed on the north bank to allow for a future bicycle and pedestrian pathway. A low flow fish passage channel is provided.


EXIST CONCRETE LINING TO REMAIN
EXIST CONCRETE LINING TO BE REMOVED
EL. -1.5'
6'
1
½
9'
40'
PROPOSED BENCH AND CHANNEL SECTION W/ LOW FLOW CHANNEL FOR FISH PASSAGE

BAYSHORE FREEWAY BRIDGE

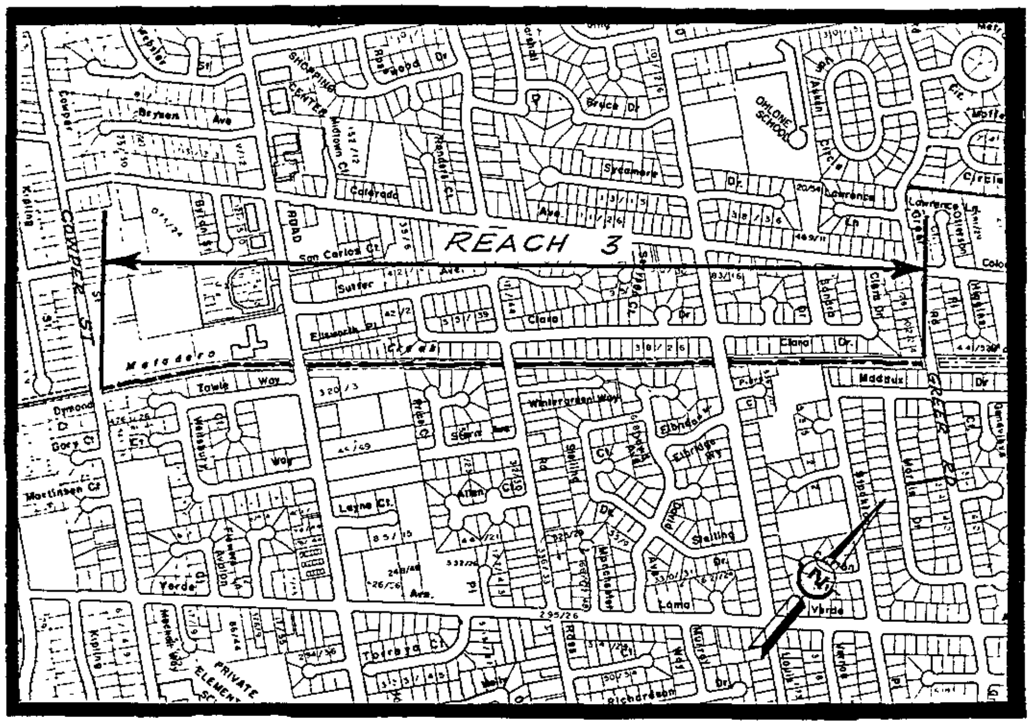

R/W
R/W
EXIST. R/W WIDTH = 100'
PROPOSED HEIGHT OF FLOODWALLS VARIES 2.5' TO 4.5'
EXIST. FENCE TO REMAIN
2'
PROPOSED FLOODWALL SOUTH BANK
1
1
NATURAL CHANNEL BOTTOM
40'
EXIST. FENCE TO REMAIN
2'
EXIST. NORTH BANK FLOOD WALL TO BE RAISED TO EL 9.0'
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED (AVERAGE DEPTH =4.0')
EXIST. SACKED CONCRETE TO REMAIN

TYPICAL SECTION
BAYSHORE FREEWAY TO GREER ROAD

REACH 2 TYPICAL SECTIONS
MATADERO CREEK: BAYSHORE FREEWAY TO GREER ROAD

The existing right of way width in this reach is 100 feet. Maintenance roads are located on both banks, the channel banks have been lined with sacked concrete, the channel bottom is unlined and will remain so except below Bayshore Freeway.

The total estimated cost of measures proposed in Reach 2 is $468,000.



Reach 3: Matadero Creek - Greer Road to Cowper Street

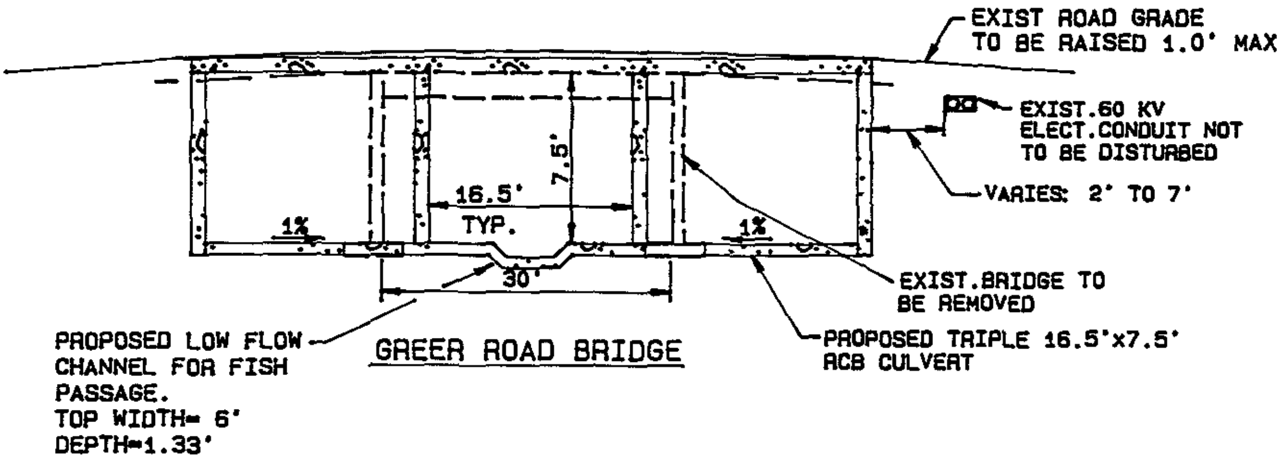
Reach 3 extends from the downstream side of Greer Road to the downstream side of Cowper Avenue, a total distance of about 4,600 feet. The proposed flood control measures consist of replacing the existing inadequate culverts at Greer Road, Middlefield Road, Ross Road, and Louis Road, and adding floodwalls about 2.5 feet high to the top of the existing concrete channel. The total one percent design flow rate in this reach is 3,500 cfs and includes 600 cfs from Barron Creek.

The existing right of way width between Louis Road and Cowper Avenue averages 60 feet and includes a 15-foot maintenance patrol road on one bank and a five-foot wide path on the other bank. Right of way width narrows to 50 feet downstream of Louis Road and then widens to 70 feet for the remaining 1,200 feet to Greer Road. There is an existing maintenance access ramp on the north bank downstream of Louis Road. Adjacent ground is generally about one or two feet below the existing top of bank in this reach. The existing channel is a concrete-lined trapezoidal section with a 20-foot bottom width between Greer and Louis Roads and a 13-foot bottom width upstream of Louis Road. Side slopes of the channel are 1 to 1 downstream of Louis Road and 1.5 to 1 upstream. A 60 KV buried electrical conduit runs along the north bank at an average depth of about four feet. This conduit must not be disturbed. A minimum clear distance of two feet will be provided between the thermal sand and any permanent concrete structures.

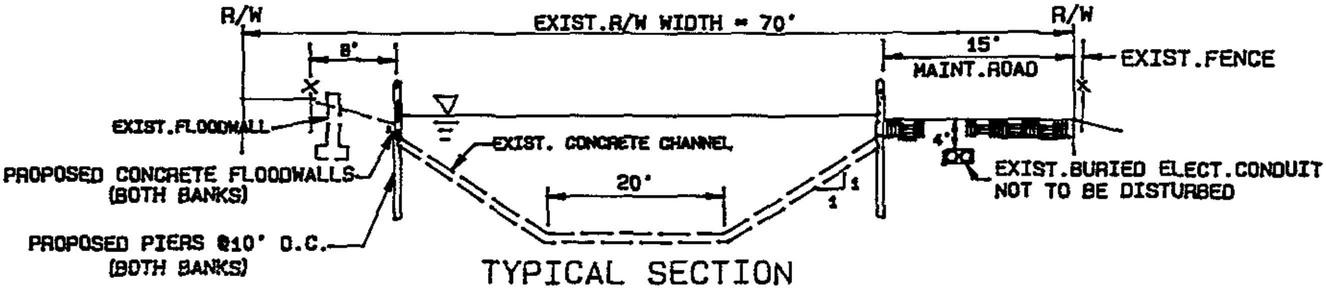
The Greer Road bridge will be replaced to allow construction of a larger triple cell bridge with a higher soffit elevation. A low flow channel for fish passage will be provided in the center cell. The low flow channel will have a free outfall on the downstream face. The road centerline profile will not significantly change but the curbs and gutters may be raised about one foot. The proposed piers will be round nosed with a sloping upstream face to minimize debris loading. Flow velocities in this reach are relatively low because of a wide channel section, fairly flat slope, and backwater from the flood basin.

The Louis Road bridge will be replaced to allow construction of a larger channel section designed to conform to the downstream channel. The downstream channel has a 20-foot bottom width and one to one side slopes while the upstream channel narrows to a 13-foot bottom width and one and one-half to one side slopes. The transition will be located upstream of the Louis Road bridge. The existing access ramp will be reconstructed because it must rise over the proposed floodwall before ramping down into the channel. The new channel section will include a fish resting pool. The resting pool will extend the length of the new lining and will include a vertical face at the upstream and downstream end. This bridge has an estimated span length of about 35 feet and will be a clear span bridge.

The Ross and Middlefield Road bridges are similar in that they both have proposed span lengths of about 40 feet and a proposed channel section with a 13-foot bottom width and one and one-half to one side slopes with a low flow fish channel.


EXIST ROAD GRADE TO BE RAISED 1.0' MAX
EXIST.60 KV ELECT.CONDUIT NOT TO BE DISTURBED
VARIES: 2' TO 7'
16.5' TYP.
7.5'
1%
1%
30'
EXIST.BRIDGE TO BE REMOVED
PROPOSED TRIPLE 16.5'x7.5' RCB CULVERT
PROPOSED LOW FLOW CHANNEL FOR FISH PASSAGE.
TOP WIDTH= 6'
DEPTH=1.33'

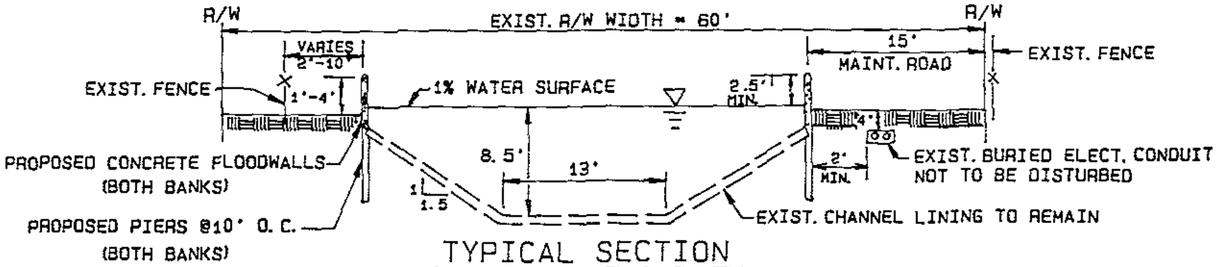
GREER ROAD BRIDGE


R/W
EXIST.R/W WIDTH = 70'
R/W
8'
15'
MAINT.ROAD
EXIST.FENCE
EXIST.FLOODWALL
EXIST. CONCRETE CHANNEL
PROPOSED CONCRETE FLOODWALLS (BOTH BANKS)
20'
1
1
4'
EXIST.BURIED ELECT.CONDUIT NOT TO BE DISTURBED
PROPOSED PIERS @10' O.C. (BOTH BANKS)

TYPICAL SECTION

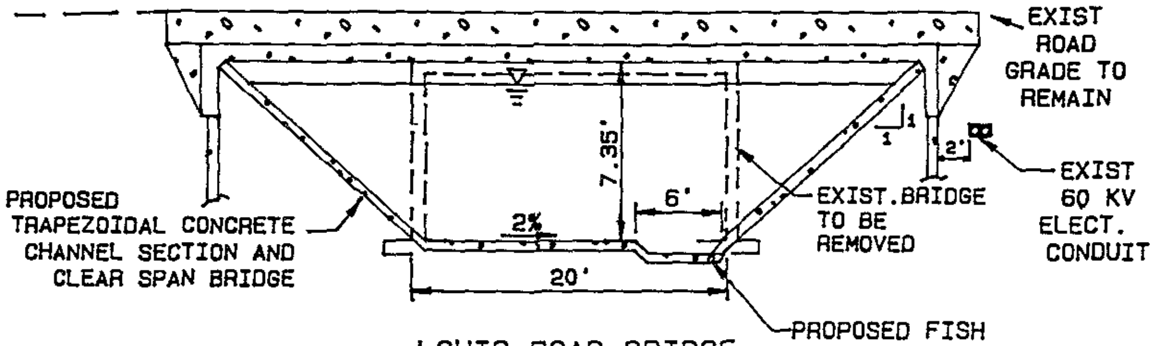
GREER ROAD TO LOUIS ROAD

REACH 3 TYPICAL SECTIONS
MATADERO CREEK: GREER ROAD TO COWPER STREET


R/W
EXIST. R/W WIDTH = 60'
R/W
VARIES
2'-10"
15'
MAINT. ROAD
EXIST. FENCE
EXIST. FENCE
1'-4'
1% WATER SURFACE
2.5' MIN.
4'
PROPOSED CONCRETE FLOODWALLS (BOTH BANKS)
8.5'
13'
2' MIN.
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED
1
1.5
PROPOSED PIERS @10' O. C. (BOTH BANKS)
EXIST. CHANNEL LINING TO REMAIN

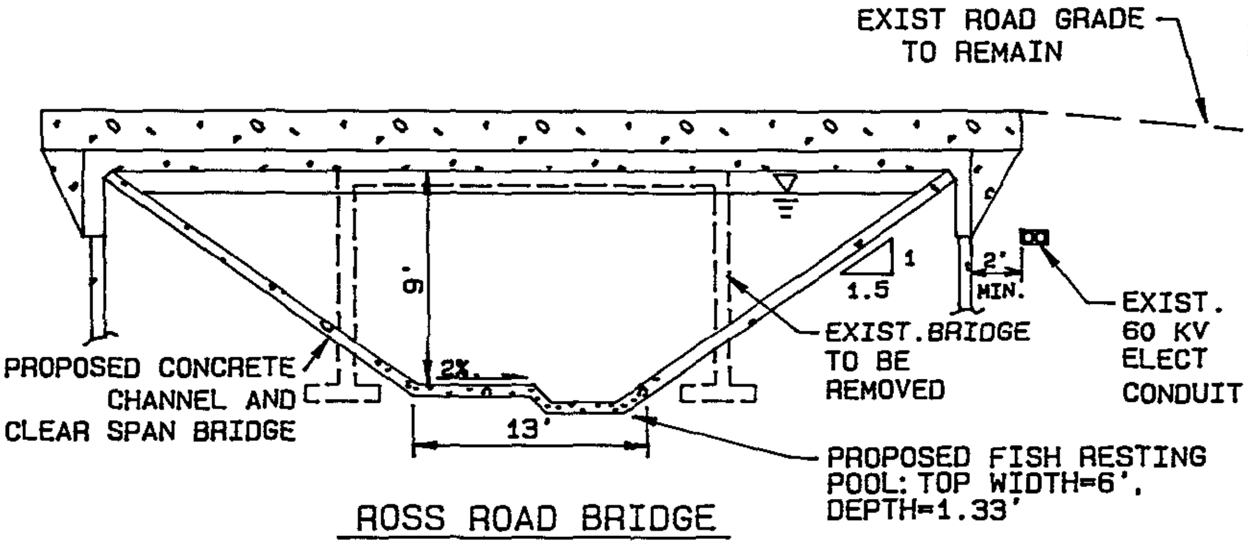
TYPICAL SECTION

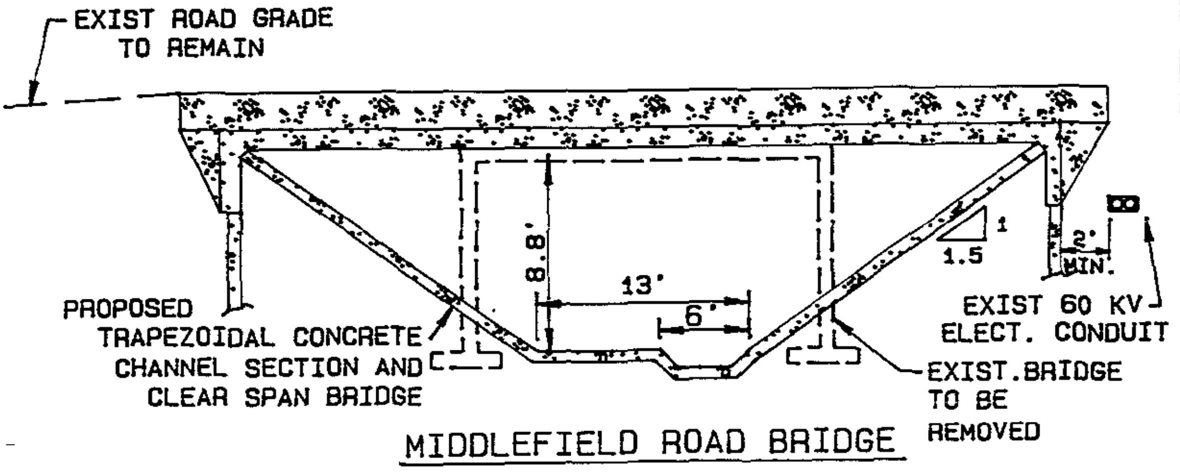
LOUIS ROAD TO COWPER STREET


EXIST ROAD GRADE TO REMAIN
1
1
2'
EXIST 60 KV ELECT. CONDUIT
7.35'
6'
2%
EXIST. BRIDGE TO BE REMOVED
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
20'
PROPOSED FISH RESTING POOL: DEPTH= 1.33'

LOUIS ROAD BRIDGE

REACH 3 TYPICAL SECTIONS
MATADERO CREEK: GREER ROAD TO COWPER STREET

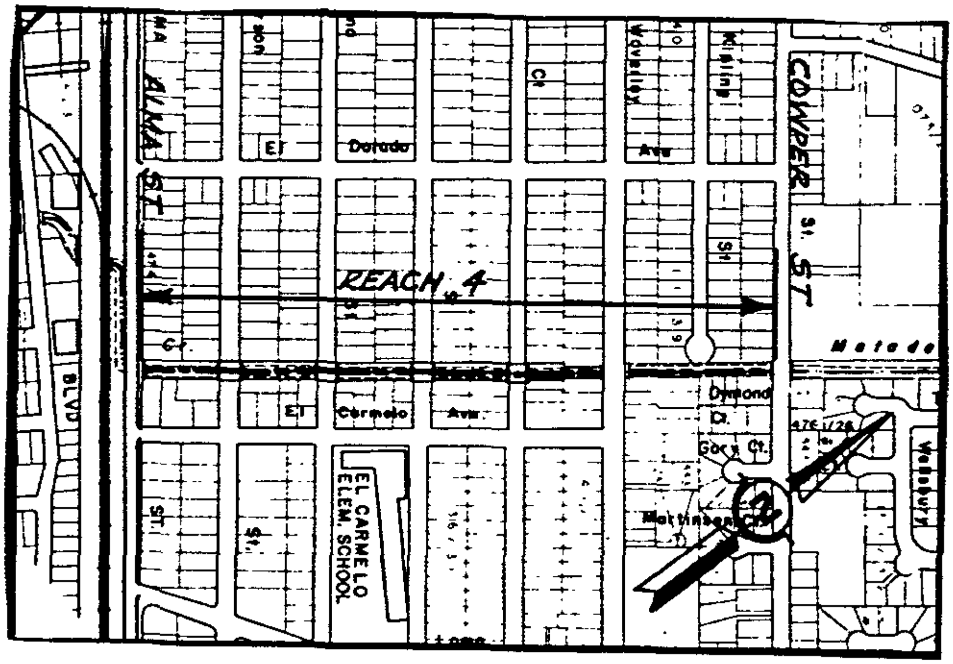

EXIST ROAD GRADE TO REMAIN
9'
1
1.5
2' MIN.
EXIST. 60 KV ELECT CONDUIT
EXIST. BRIDGE TO BE REMOVED
PROPOSED CONCRETE CHANNEL AND CLEAR SPAN BRIDGE
2%
13'
PROPOSED FISH RESTING POOL: TOP WIDTH=6', DEPTH=1.33'
ROSS ROAD BRIDGE


EXIST ROAD GRADE TO REMAIN
8.8'
13'
6'
1
1.5
2' MIN.
EXIST 60 KV ELECT. CONDUIT
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
EXIST. BRIDGE TO BE REMOVED
MIDDLEFIELD ROAD BRIDGE

REACH 3 TYPICAL SECTIONS
MATADERO CREEK: GREER ROAD TO COWPER STREET

Floodwalls about 2.5 feet high will be added to the existing top of concrete channel and will be tied into the proposed bridge headwalls at Greer Road, Louis Road, Ross Road, Middlefield Road, and the downstream side of Cowper Avenue. The existing maintenance ramp on the downstream side of Louis Road will be modified to incorporate ramps over the proposed floodwall.

The total estimated cost of measures proposed in Reach 3 is $3.3 million.



Reach 4: Matadero Creek - Cowper Street to Alma Street

Reach 4 extends from the downstream side of Cowper Street to the downstream side of Alma Street, a total distance of about 2,200 feet. The proposed flood control measures consist of widening 600 feet of existing concrete channel between Cowper Street and Waverly Street, adding floodwalls about two feet high from the upstream side of Waverly Street to the downstream side of Alma Street, and constructing new clear-span bridges at Cowper and Waverly Streets. The total one percent design flow rate in this reach is 3,500 cfs and includes 600 cfs from Barron Creek.

The existing right of way width is 40 feet between Cowper and Waverly Streets. The northerly 30 feet is owned in fee by the District and the southerly 16 feet is a flood control easement. The southern limit of the easement extends approximately five feet beyond the existing fence line into adjacent yards but will not need to be utilized.

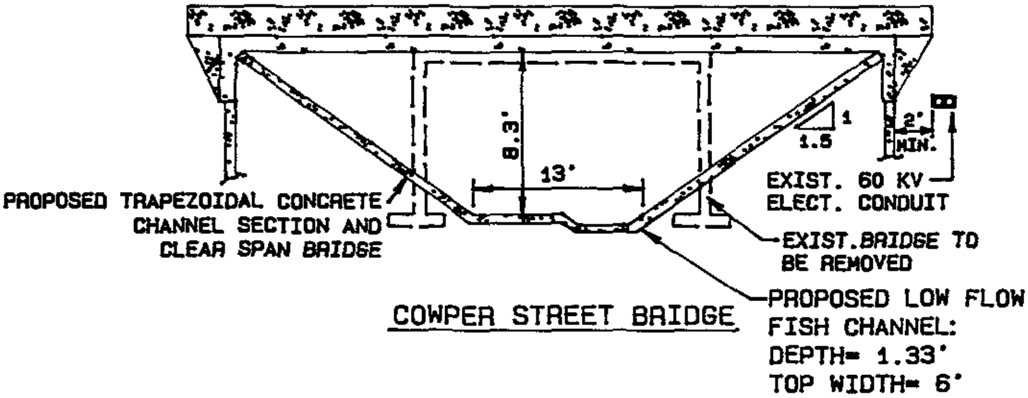
On the upstream side of Waverly Street, the right of way narrows to 40 feet for a distance of 135 feet along the channel. This short reach is particularly narrow and it may be necessary to remove fences and some vegetation during construction. Both would be replaced following construction. The City of Palo Alto has a five-foot wide utility easement on the northerly bank. An existing 60 KV buried electrical conduit and an 18-

inch sanitary sewer are located on the north bank. Beyond this point to the downstream side of Alma Street, the right of way width is 60 feet. There is an existing bicycle bridge and a pedestrian bridge at Bryant Street. Proposed floodwalls will conform to both bridge abutments.

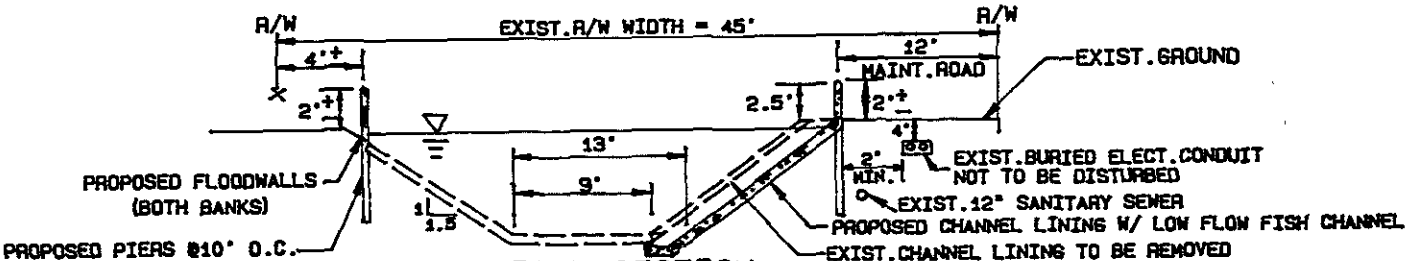
Because of the constraints on bridge raising and floodwall heights, it is proposed that the existing concrete channel from Cowper Street to 50 feet upstream of Waverly Street be enlarged along the northerly bank. The proposed channel will be the same as downstream of Cowper Street; bottom width of 13 feet and side slopes of 1.5 to 1. By widening this 600-foot long stretch of channel in Reach 4, the design water surface will remain below adjacent ground, maximum floodwall height will be less than about two feet and the Waverly Street road grade will not change when the bridge is replaced. This reach of north bank channel replacement and the channel replacement at the Waverly and Cowper Street bridges will include a low flow channel for fish passage.

Upstream of Waverly Street, the widened trapezoidal channel will transition back into the narrower existing channel (nine-foot bottom width). The channel gradually becomes deeper with respect to the adjacent land and the water surface will be below the existing top of banks through the upstream portion of Reach 4. Floodwalls with a maximum height of two feet would be added to the top of the existing channel up to Alma Street. Special precaution must be taken to assure that the City of Palo Alto's existing 60 KV buried electrical conduit is not disturbed.

The estimated total cost of measures proposed in Reach 4 is $1.4 million.



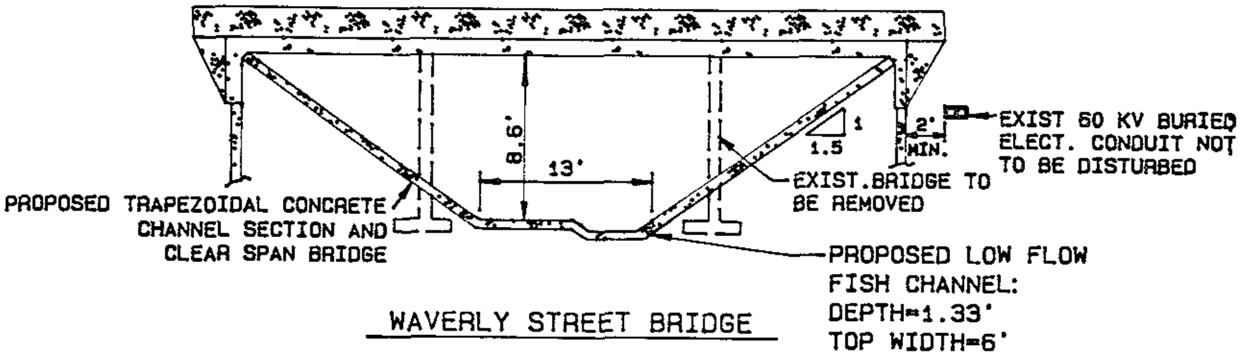
COWPER STREET BRIDGE



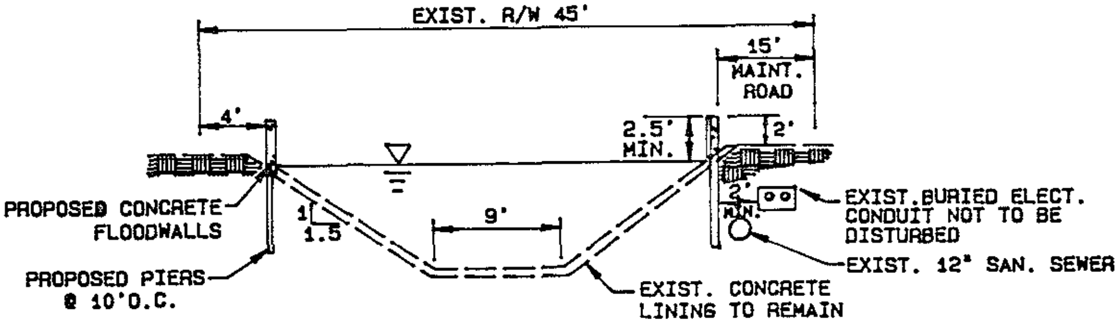
TYPICAL SECTION

COWPER STREET TO WAVERLY STREET

REACH 4 TYPICAL SECTIONS
MATADERO CREEK: COWPER STREET TO ALMA STREET


8.6'
13'
1
1.5
2'
MIN.
EXIST 60 KV BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST.BRIDGE TO BE REMOVED
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
PROPOSED LOW FLOW FISH CHANNEL:
DEPTH=1.33'
TOP WIDTH=6'

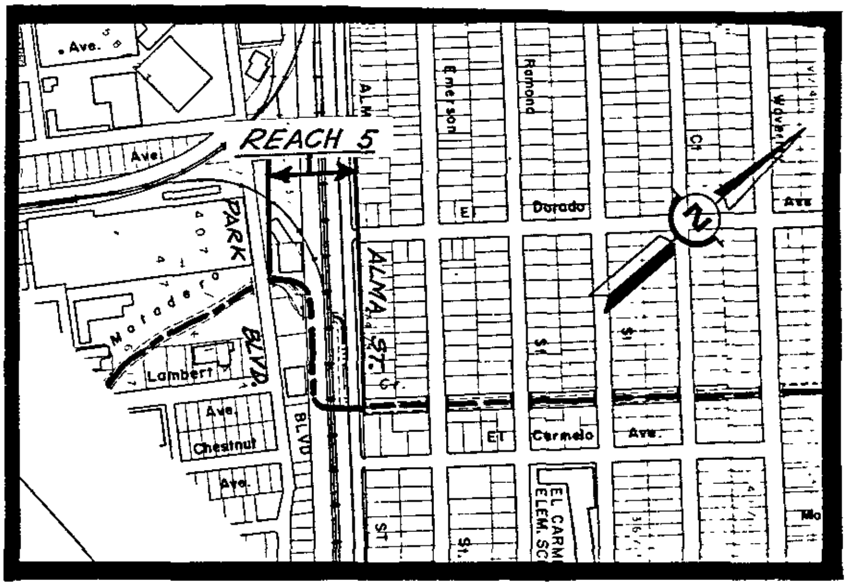
WAVERLY STREET BRIDGE


EXIST. R/W 45'
15'
MAINT. ROAD
4'
2.5' MIN.
2'
2' MIN.
9'
1
1.5
PROPOSED CONCRETE FLOODWALLS
PROPOSED PIERS @ 10'O.C.
EXIST. CONCRETE LINING TO REMAIN
EXIST.BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST. 12" SAN. SEWER

TYPICAL SECTION

WAVERLY STREET TO ALMA STREET

REACH 4 TYPICAL SECTIONS
MATADERO CREEK: COWPER STREET TO ALMA STREET



Reach 5: Matadero Creek - Alma Street to Park Boulevard

Reach 5 extends from the downstream side of Alma Street to the downstream side of Park Boulevard, a total distance of 800 feet. The proposed flood control measures consist of replacing all of the existing inadequate channel and constructing a new culvert for the Southern Pacific Railroad. The one percent design flow rate in this reach is 3,100 cfs and includes 600 cfs from Barron Creek.

The existing right of way width varies from a maximum of 40 feet upstream of the SPRR to just 25 feet where the channel runs immediately adjacent to Alma Street. The adjacent land use consists of industrial buildings, parking lots, railroad tracks, and Alma Street. The combination of several different channel cross sections, four turns in the channel alignment and multiple bridge piers at the SPRR makes this reach particularly inefficient in flood carrying capacity and difficult to maintain.

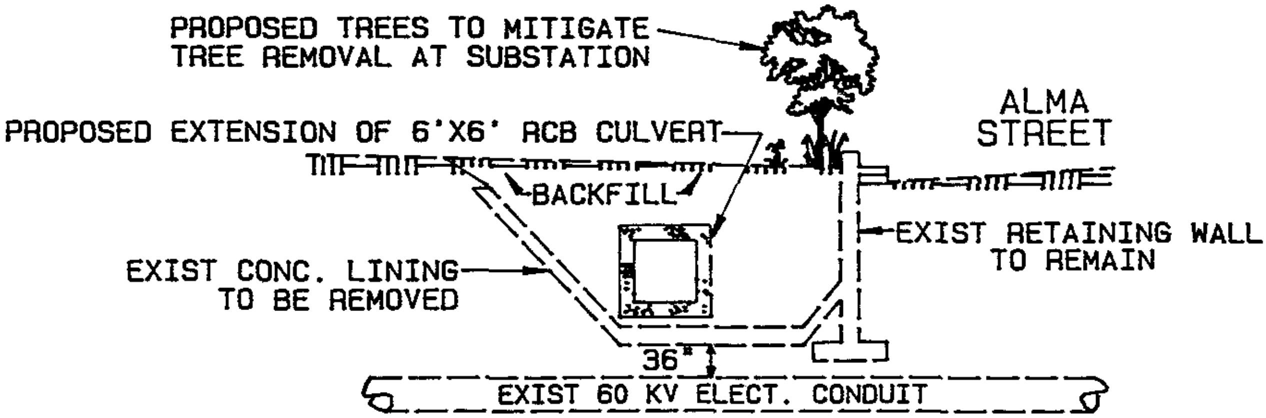
To increase channel capacity and improve maintenance access of this reach, an entirely new channel will be constructed. The new channel alignment would eliminate two of the turns, increase the radius of the two turns that will remain, increase channel capacity, improve flow characteristics and allow the Matadero Bypass concept to be implemented upstream of El Camino Real by decreasing the present backwater effects.

The proposed measures consist of replacing the existing trapezoidal concrete channel with a new 25-foot wide rectangular concrete channel on the new alignment. Measures also include a new culvert for the SPRR crossing. The proposed SPRR culvert has been designed to function in concert with the existing Alma Street culvert.

The new channel alignment will run on the westerly side of the SPRR tracks rather than on the easterly side adjacent to Alma Street. A new box culvert will be constructed at the SPRR and will tie into the existing Alma Street culvert. Upstream of the proposed SPRR culvert, a splitter wall will help guide the approaching flow evenly around the bend and into the SPRR and Alma culverts. The radius of this approach bend should be as large as practical to minimize wave run up but not less than 30 feet. The proposed SPRR culvert should be 9.5 feet high and 20 feet wide to conform with the existing Alma Street culvert. The preferred construction technique is to bore and jack under the railroad. The SPRR-Alma interface must be watertight because the culvert will flow under pressure during the one percent flood. The culverts also must be capable of resisting the buoyant forces that will develop under presure flow. An existing 10-inch water main located on the upstream face of Alma Street culvert will be relocated.

Construction of a new SPRR culvert and channel alignment will improve flow conditions and channel capacity. After the new channel has been constructed, the old channel lining adjacent to Alma Street will be removed and backfilled. The existing 6' x 6' box culvert storm drain that enters Matadero Creek near Alma Street will be extended about 400 feet downstream and outfall into the proposed box culvert at SPRR. Trees and shrubs will be planted in the backfilled channel adjacent to Alma Street to mask the railroad and to mitigate the impact of the removal of existing Eucalyptus trees adjacent to the Palo Alto electrical substation.

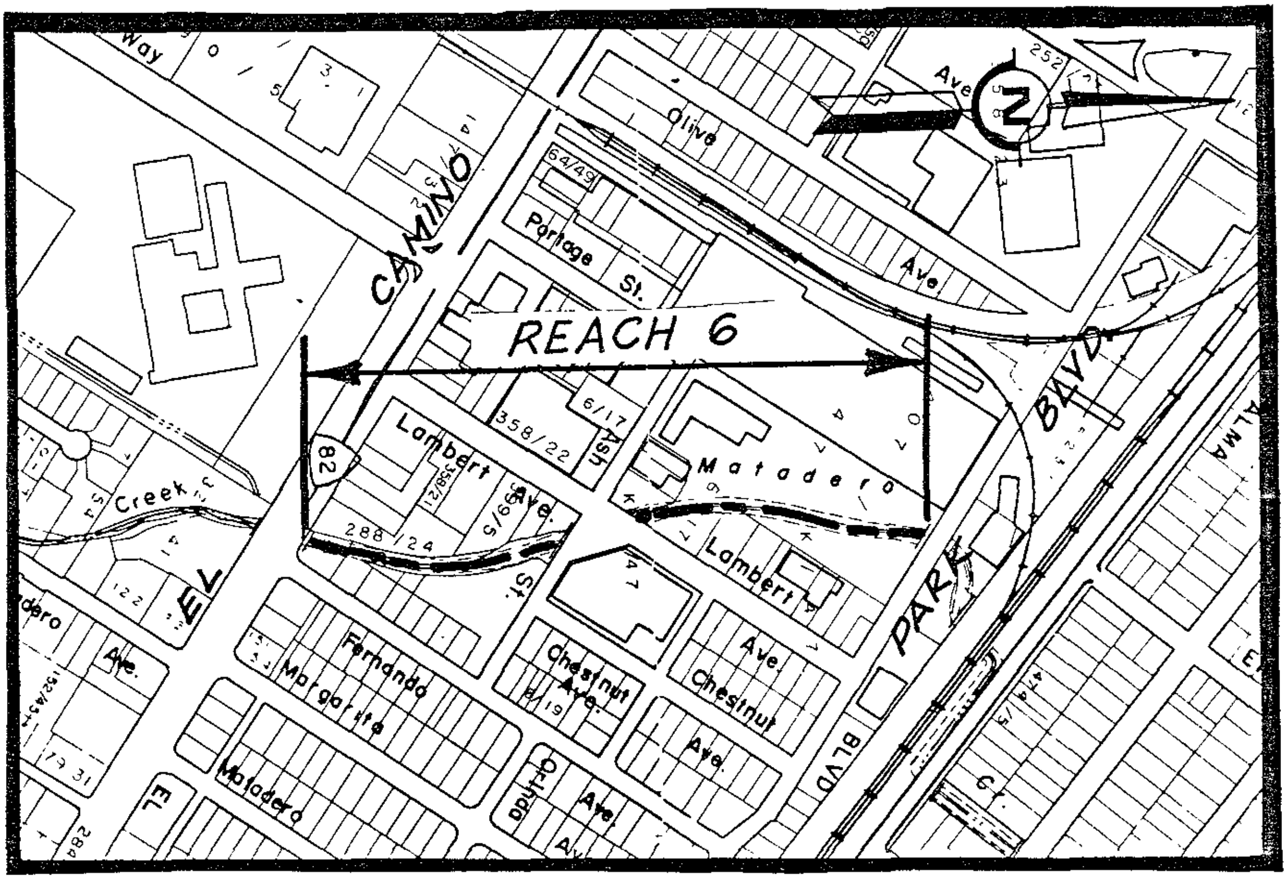
The estimated total cost of the proposed measures in Reach 5 is $1.8 million.


PROPOSED TREES TO MITIGATE TREE REMOVAL AT SUBSTATION
PROPOSED EXTENSION OF 6'X6' RCB CULVERT
ALMA STREET
BACKFILL
EXIST RETAINING WALL TO REMAIN
EXIST CONC. LINING TO BE REMOVED
36"
EXIST 60 KV ELECT. CONDUIT

SECTION A-A

ALMA STREET TO SPRR

REACH 5 TYPICAL SECTIONS
MATADERO CREEK: COWPER STREET TO ALMA STREET

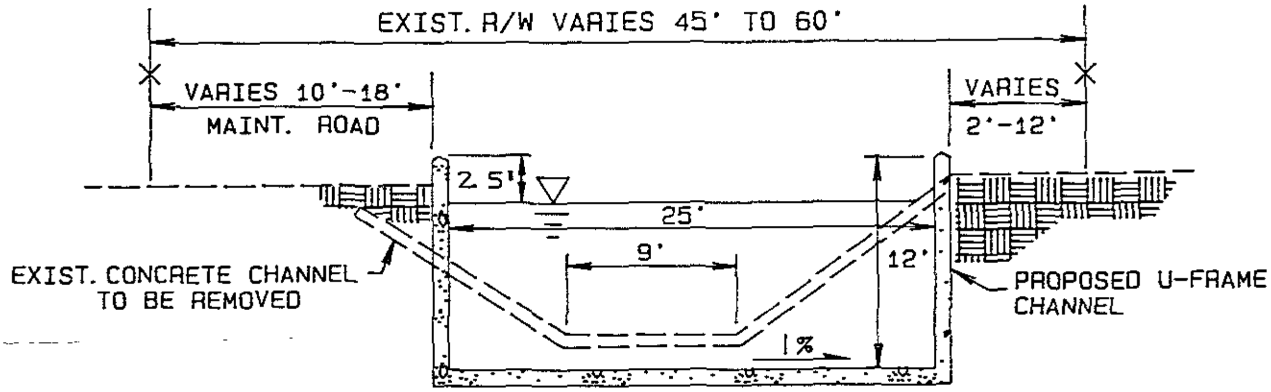


Reach 6: Matadero Creek - Park Boulevard to El Camino Real

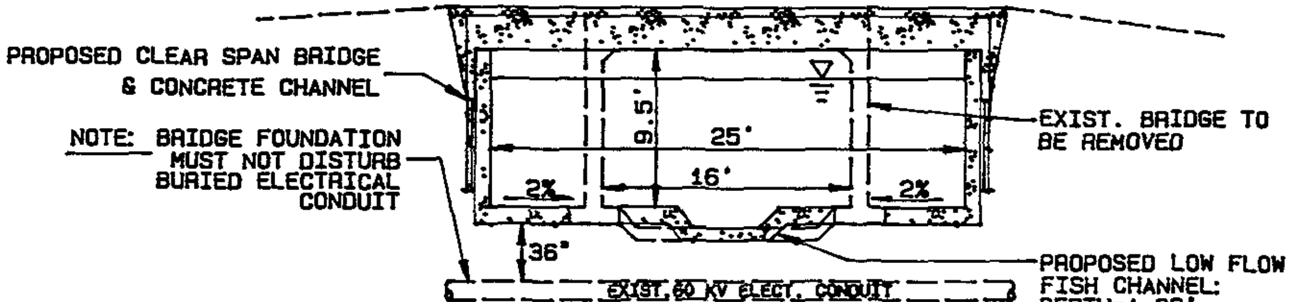
Reach 6 extends from the downstream side of Park Boulevard to the downstream side of El Camino Real, a total distance of about 1,600 feet. The proposed flood control measures consist of replacing the existing trapezoidal concrete channel and culverts at Lambert Street and Park Boulevard.

The existing right of way width varies from a maximum of 60 feet to a minimum of 40 feet. Adjacent land use consists primarily of commercial and industrial buildings and parking lots and a city park. There is an existing maintenance road and ramp on the southerly side of the channel between Park Boulevard and Lambert Street.

The existing trapezoidal concrete channel will be replaced with a larger 25-foot-wide rectangular channel. The new channel is required to allow the Matadero Bypass channel upstream of El Camino Real to operate correctly. Because the Matadero Bypass channel is proposed to follow the existing Stanford channel alignment but will be designed to carry 1,700 cfs rather than 200 cfs that Stanford channel now carries, downstream channel modifications are required to avoid backwater effects of the



TYPICAL SECTION
PARK BLVD. TO EL CAMINO REAL


PROPOSED CLEAR SPAN BRIDGE & CONCRETE CHANNEL
NOTE: BRIDGE FOUNDATION MUST NOT DISTURB BURIED ELECTRICAL CONDUIT
9.5'
25'
16'
2%
2%
36"
EXIST. 60 KV ELECT. CONDUIT
EXIST. BRIDGE TO BE REMOVED
PROPOSED LOW FLOW FISH CHANNEL: DEPTH=1.33' TOP WIDTH=6'

LAMBERT AVE. BRIDGE

REACH 6 TYPICAL SECTIONS
MATADERO CREEK: PARK BLVD. TO EL CAMINO REAL

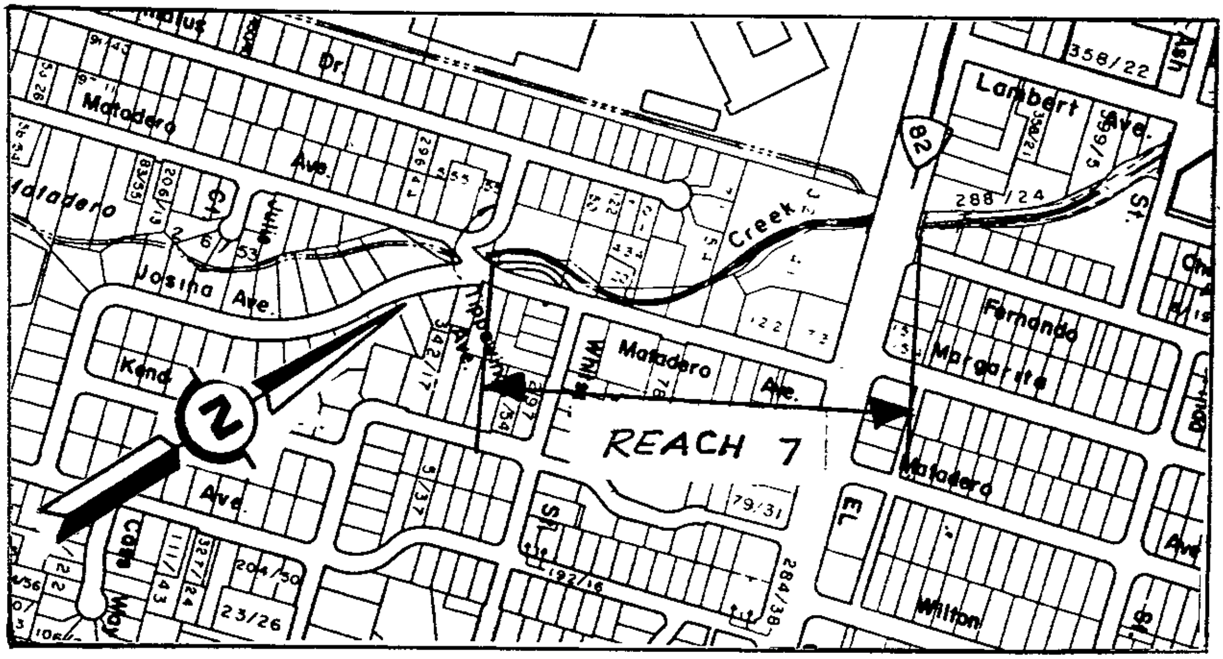
combining flows of Matadero Creek and Matadero bypass. The proposed channel bottom will be lowered by about 2.5 feet on the downstream side of the confluence to reduce backwater effects. Without this proposed channel modification, both the existing Matadero Creek culvert and the proposed Matadero bypass culvert under El Camino Real would flow under pressure. The natural stream channel would then require concrete floodwalls at least three feet high upstream of El Camino Real.

Backwater effects from the SPRR-Alma Street culvert will carry upstream to Park Boulevard and necessitate its replacement and raising. The proposed channel bottom will be about 2.5 feet lower and the road grade will need to be raised by approximately one foot. The road grade raising will affect Park Boulevard for about 150 feet on each side of Matadero Creek and will meet all necessary design criteria of the City of Palo Alto.

Access to both the creek channel and the proposed bypass channel will be provided by a ramp upstream of Lambert Avenue. A second ramp is proposed downstream of Lambert Avenue. An existing streamflow station will be relocated to accommodate the proposed access ramp. Below the Sizzler Family Steak House, the existing concrete-lined trapezoidal section will be replaced with the proposed 25-foot rectangular channel and a new confluence will be constructed. The proposed location of the confluence of the existing Matadero Creek channel and the proposed bypass channel is below the easterly sidewalk of El Camino Real. This confluence location has been designed to reduce the angle of the junction between the two channels and consequently improve hydraulic performance.

The full length of the U-frame channel from Park Boulevard to El Camino Real will include a low flow channel in the center for fish passage. At the El Camino confluence the low flow channel will direct fish toward the natural creek.

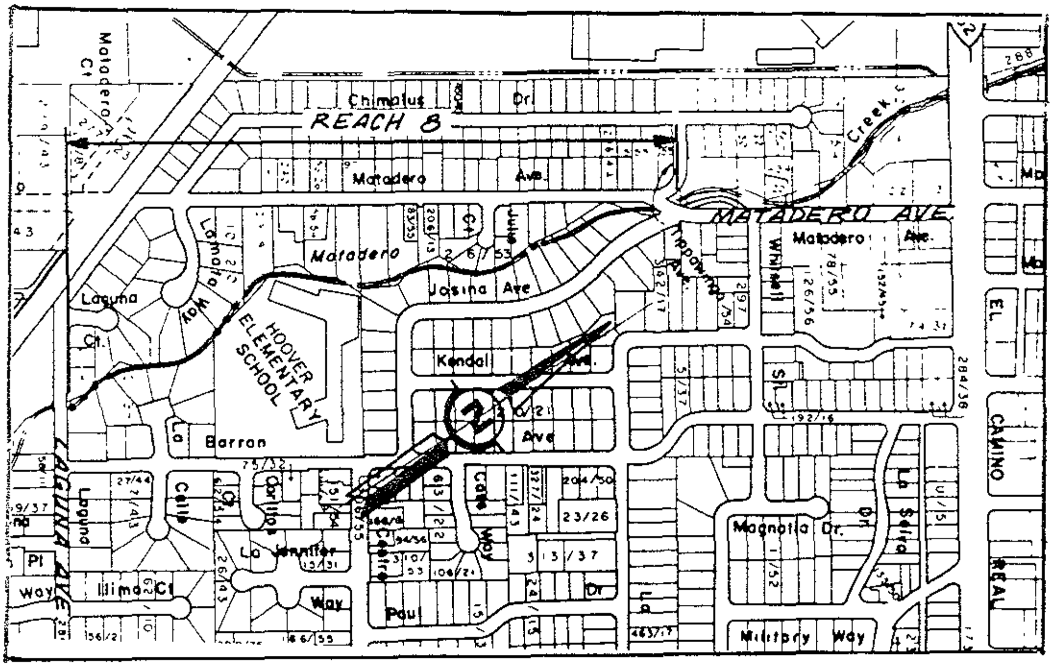
The estimated total cost of measures proposed in Reach 6 is $2.5 million.



Reach 7: Matadero Creek - El Camino Real to Matadero Avenue

Reach 7 extends along Matadero Creek from the downstream side of El Camino Real to the downstream side of Matadero Avenue, a total distance of about 1,200 feet. The proposed flood control measures consist of leaving the existing natural stream channel as is and constructing a new underground bypass channel around the north side of the natural creek. This portion of the bypass channel is designated Reach 7B and is described in a following section. The one percent design flow rates are 1,700 cfs for the Matadero Bypass and 1,300 cfs for Matadero Creek. The combined one percent design flow rate downstream of El Camino Real is 3,000 cfs.

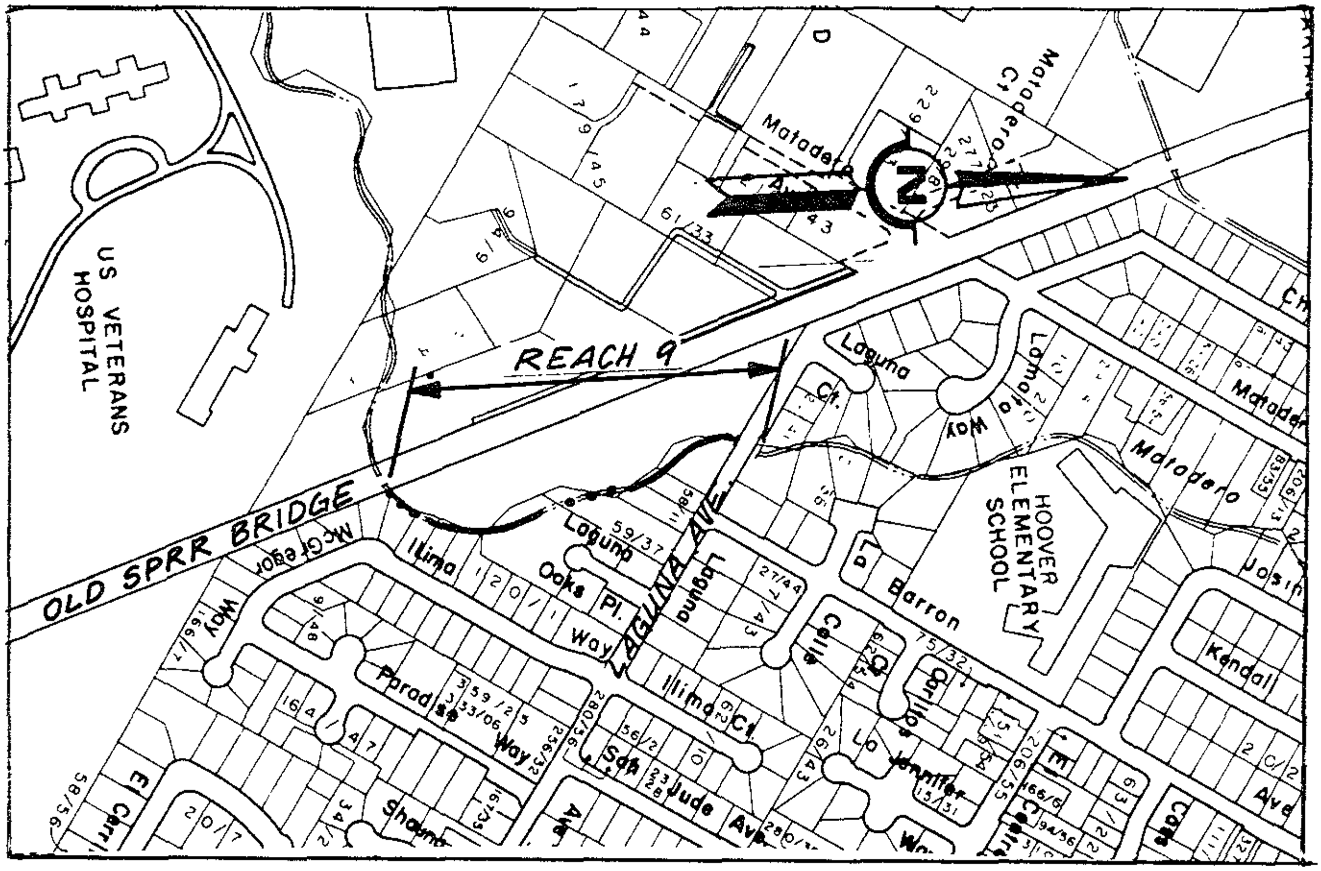
The existing Matadero Creek right of way width varies from about 15 feet to about 40 feet. The adjacent land use consists of a motel in the downstream portion and single family homes upstream. A portion of the creek adjacent to two residences on the southerly bank remains in private ownership and the District does not presently have an easement. In this area an easement is proposed to be acquired for maintenance purposes. Matadero Creek is essentially a natural stream in this reach and is lined with many large oak trees. Downstream of Matadero Avenue bridge, there are several large oaks growing within the stream channel. The only measures proposed for the natural channel are right of way acquisition and long-term maintenance.



Reach 8: Matadero Creek - Matadero Avenue to Laguna Avenue

Reach 8 of Matadero Creek extends from the downstream side of Matadero Avenue to the downstream side of Laguna Avenue, a distance of about 2,600 feet. The proposed flood control measures in this reach consist of constructing a two foot high earth berm for about 200 feet upstream of Matadero Avenue on the south bank of the existing natural stream channel and replacing the existing sacked concrete weirs with cross channel stabilizers flush with the channel bottom. The cross channel stabilizers will be constructed of either grouted rock or redwood logs and will incorporate a low flow vee-notch near the center of the creek. Scour and erosion on the downstream side of the existing sacked concrete weirs will be repaired as an element of the cross channel stabilizer work.

The proposed bypass channel, within the 80-foot-wide old Southern Pacific right of way, will carry high flows around this reach of natural creek. The bypass channel is described in the following section on Reach 8B.



Reach 9: Matadero Creek - Laguna Avenue to old SPRR Bridge

Reach 9 extends from Laguna Avenue to the old SPRR bridge, a total distance of about 1,100 feet along the Matadero Creek stream channel. The proposed flood control measures in this reach consist primarily of leaving the existing natural stream channel undisturbed. An underground concrete bypass channel will begin at the upstream side of the old SPRR bridge, where a diversion structure will be located, and will generally follow the old SPRR right of way below the existing bike path. The proposed bypass channel is described in the section on Reach 9B.

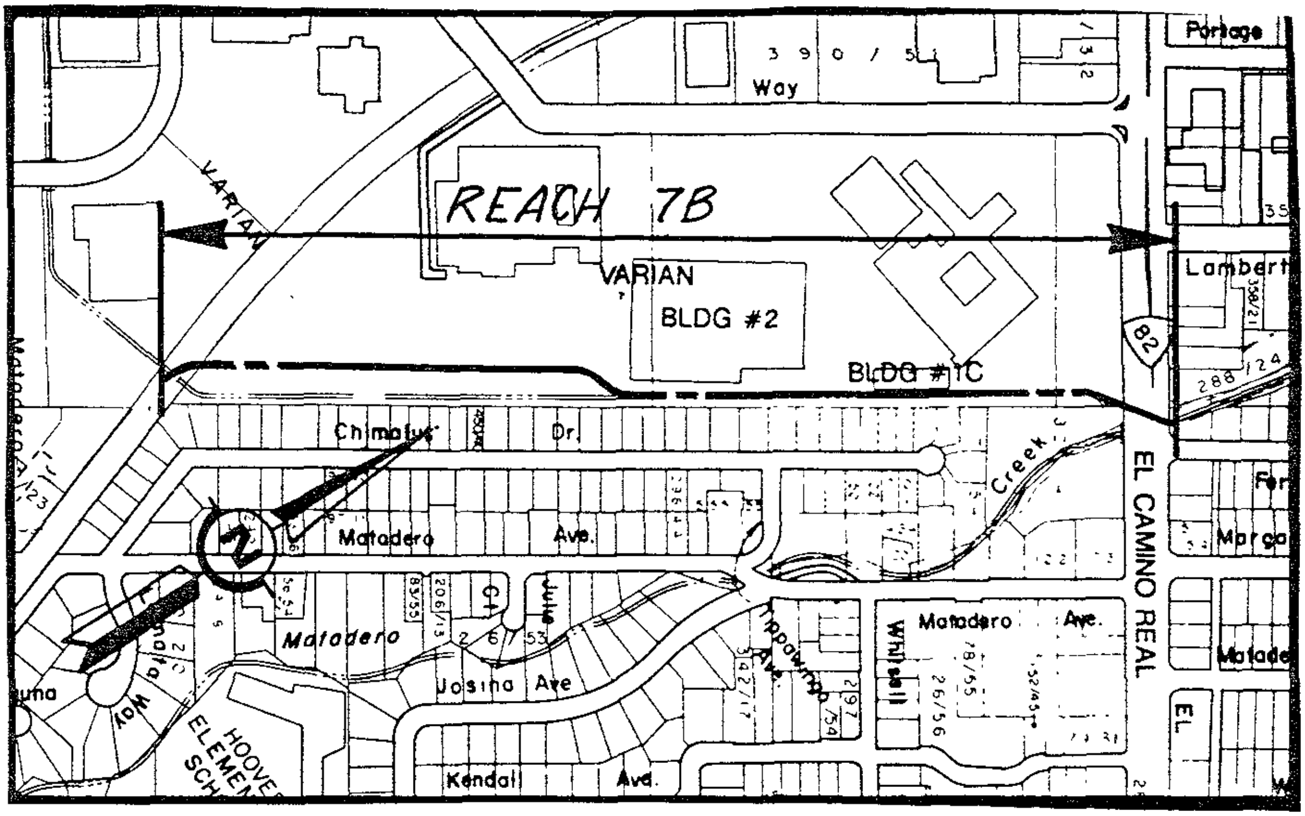
Measures proposed in the natural channel consist of stabilizing the banks and channel bottom in the area just downstream of the old SPRR bridge. This is proposed to prevent erosion due to moderate flow velocities. These measures will include removal of the existing gunite along the south bank of the natural channel downstream of the old railroad bridge. The bank will be stabilized with gabions. The gabions will have top soil placed on them and will be revegetated with native plant species.

The existing sacked concrete weirs will be removed and replaced with cross channel stabilizers flush with the channel bottom. The cross channel stabilizers will be constructed of grouted rock or redwood logs and will incorporate a low flow vee-notch near the center of the creek channel.

Foot and bicycle traffic will be temporarily detoured during construction of the underground box culvert bypass channel. The proposed detour will be reviewed and approved by the Palo Alto Transportation Division.

All impacts to adjacent vegetation will be mitigated as explained in the environmental document.

The total estimated cost of measures proposed in Reaches 7, 8, and 9 is $75,000.



Reach 7B: Matadero Bypass - El Camino Real to City Bike Path

Reach 7B extends along the proposed Matadero Bypass Channel from its confluence with Matadero Creek at El Camino Real to the City's bike path. The approximate length of this reach is 2,500 feet.

In this same reach, the District's existing Stanford Channel easement is 50 feet wide and is owned by Stanford University. The adjacent land use consists of single family residences along the southerly side and the Stanford Industrial Park (Varian Associates) on the northerly side. The existing Stanford Channel is an open concrete-lined channel for about 150 feet upstream of El Camino Real and then becomes an 84-inch diameter underground concrete pipe. The 50-foot right of way also serves as a buffer strip between industry on the north and residences to the south. Varian constructed a concrete soundwall along the northerly side of the right of way in about 1984.

The proposed bypass channel in this reach is a 12-foot high by 12-foot wide underground concrete box culvert and continues upstream through Reaches 8 and 9 to the point of diversion at Bol Park. The existing confluence of the Stanford Channel and Matadero Creek occurs at the upstream side of El Camino Real. The existing box culvert and confluence angle of the bypass and existing creek channel are not adequate to carry the design bypass channel flow rate of 1,700 cfs and a new culvert must be constructed. The proposed confluence will occur at the downstream side of El Camino Real near the Sizzler Family Steak House. The confluence will include a low flow pilot channel to direct fish into the natural creek and not the bypass.

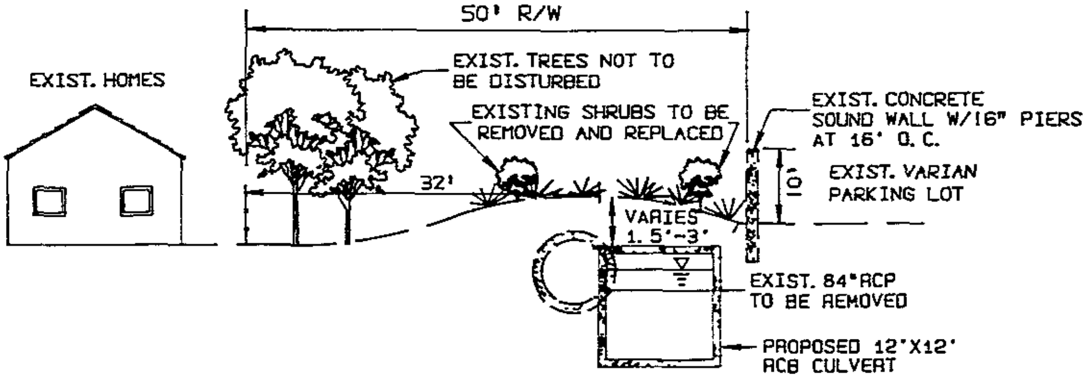
This bypass culvert has been designed to safely carry floodwaters around the natural stream and back into the Matadero Creek flood control channel at El Camino Real. In this reach the proposed bypass culvert would be partly located within existing District easement area and partly located through the Varian parking lot.

The downstream 1,500 feet of the proposed underground bypass channel would be located along the northerly side of the 50-foot wide Stanford Channel right of way. By locating the 12-foot wide channel along the northerly (Varian) side impacts to existing mature trees and disruption to homeowners along the south side will be minimized. The excavated trench will be shored along the north side to provide support to the existing soundwall during construction. Where it is needed, the south side of the trench will be shored to minimize disruption and disturbance to the existing mature trees. There will be about 30 feet of undisturbed area between the backyard fences and proposed bypass.

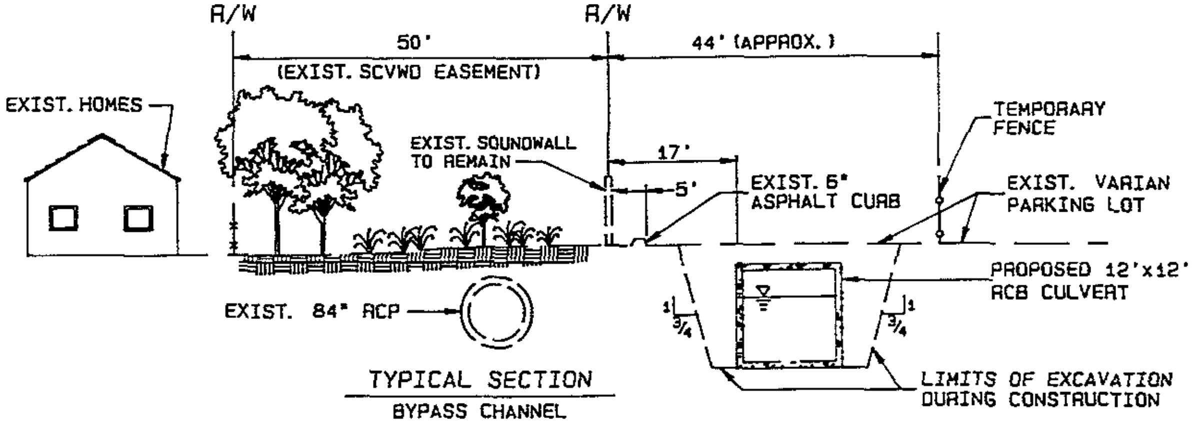
To locate the proposed box culvert along the north side of the right of way, the existing 84-inch diameter pipe and vegetation above it will be removed. After the new box culvert is in place, it will be covered with a landscaped earth berm. A revegetation and landscaping plan will be developed to help provide maximum visual and sound buffering. Homes along Chimalus Drive in the downstream portion of Reach 7B have drainage problems because of the local topography and the absence of curbs, gutters and storm drains. One of the project features is the regrading of the ground surface adjacent to the backyards to provide a vee-ditch for surface drainage. The vee-ditch will carry flows toward El Camino Real and outfall into Matadero Bypass.

The upper 1,100 feet of the Matadero Bypass Channel will be aligned through the existing Varian parking lot. This portion of the bypass extends from the westerly end of Varian Building number 2 to the City of Palo Alto's bike path. The existing parking lot will be restored following construction of the underground channel. Approximately 150 parking spaces will be temporarily lost during the construction period. Work in this area will be closely coordinated with Varian to minimize disruption to their site and operations. In particular, the loading dock access near bypass station 15+00 should not be obstructed. Construction access to the upper portion of the bypass channel should minimize disruption to Varian and the adjacent neighbors on Chimalus Drive and Matadero Avenue.

The estimated total cost of the proposed bypass channel through Reaches 7B, 8B, and 9B (its entire length) is $6.7 million.

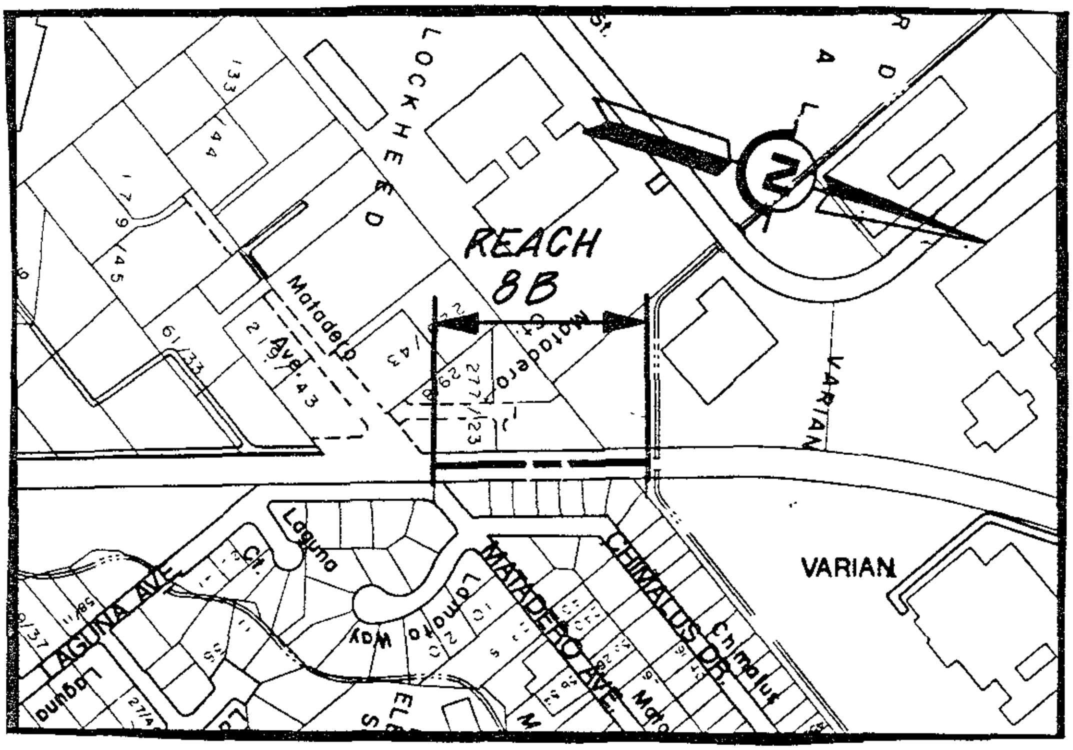

50' R/W
EXIST. HOMES
EXIST. TREES NOT TO BE DISTURBED
EXISTING SHRUBS TO BE REMOVED AND REPLACED
EXIST. CONCRETE SOUND WALL W/16" PIERS AT 16' O.C.
32'
10'
EXIST. VARIAN PARKING LOT
VARIES 1.5'-3'
EXIST. 84"RCP TO BE REMOVED
PROPOSED 12'X12' RCB CULVERT

TYPICAL SECTION
BYPASS CHANNEL
EL CAMINO REAL TO VARIAN BLDG. #2



TYPICAL SECTION
BYPASS CHANNEL
VARIAN BLDG. #2 TO CITY BIKE PATH

REACH 7B TYPICAL SECTIONS
MATADERO BYPASS CHANNEL: EL CAMINO REAL TO CITY BIKE PATH

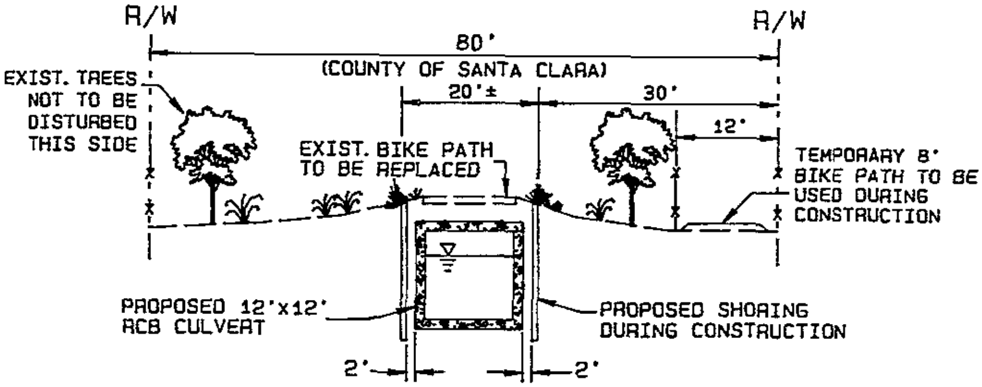


Reach 8B: Matadero Bypass - Varian to Matadero Avenue

Reach 8B extends along the proposed Matadero Bypass Channel from the point where it turns away from Varian to Matadero Avenue, a total distance of about 400 feet.

The old 80-foot wide SPRR right of way is presently owned by the County of Santa Clara and is used as a city bike path and linear park. For this portion of the reach, the box culvert bypass channel will be constructed below the existing bike path. The city has indicated that the bike path must remain open at all times. During construction, foot and bike traffic is proposed to be routed along the westerly side of the right of way. A temporary paved path and fence will be constructed. Every effort will be made to minimize vegetation loss and disruption to adjacent residents. All impacts to vegetation will be mitigated with a revegetation plan as described in the environmental document.

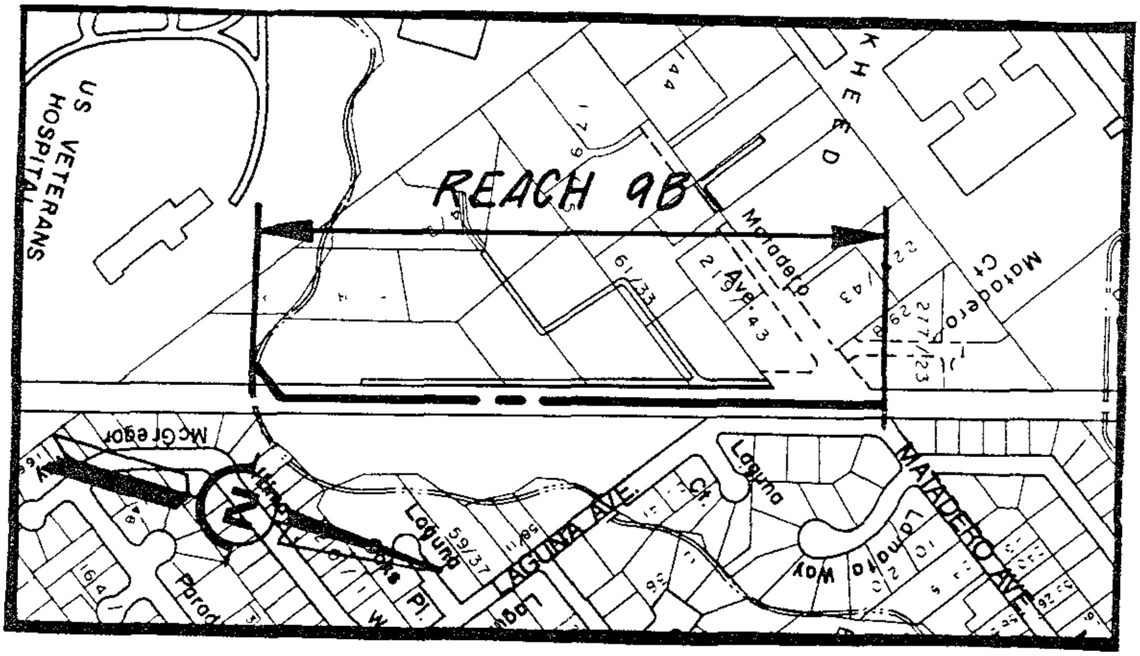
The proposed underground bypass channel would continue downstream into Reach 7B and extend upstream to its point of diversion in Reach 9B at the old SPRR bridge near Bol Park. The total cost of the entire bypass channel through Reaches 7B and 8B is $6.7 million.


R/W
R/W
80'
(COUNTY OF SANTA CLARA)
EXIST. TREES NOT TO BE DISTURBED THIS SIDE
20'±
30'
12'
EXIST. BIKE PATH TO BE REPLACED
TEMPORARY 8' BIKE PATH TO BE USED DURING CONSTRUCTION
PROPOSED 12'x12' RCB CULVERT
PROPOSED SHORING DURING CONSTRUCTION
2'
2'

TYPICAL SECTION

BYPASS CHANNEL
VARIAN TO MATADERO AVENUE

REACH 8B TYPICAL SECTIONS
MATADERO BYPASS CHANNEL: CITY BIKE PATH TO MATADERO AVENUE



Reach 9B: Matadero Bypass - Matadero Avenue to Bol Park

Reach 9B extends along the proposed Matadero Bypass Channel from Matadero Avenue to the bike path bridge over Matadero Creek in Bol Park. The total distance of the reach is about 1,500 feet.

The proposed 12-foot by 12-foot underground concrete box culvert will not be visible through Bol Park. Probably the most important aspect of the measures proposed in this reach is the bypass intake structure. This structure has been designed to allow low flows up to about 350 cfs to continue flowing in the natural stream channel down to El Camino Real but divert higher flows into the underground bypass channel. A combination trash rack and safety barrier will be installed at the bypass intake.

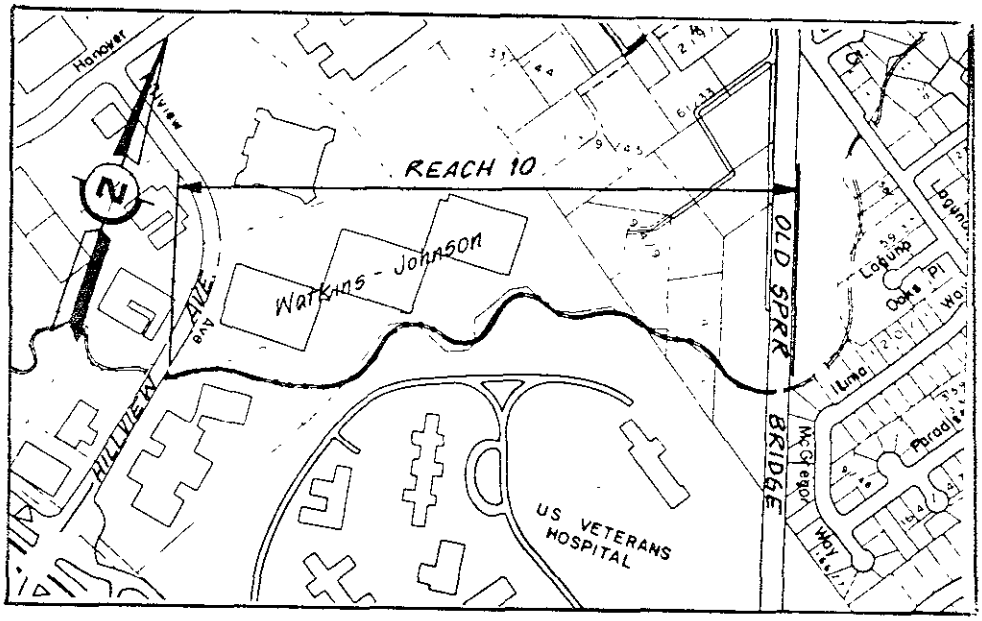
Under the one percent design flood conditions 2,200 cfs will be flowing in Matadero Creek upstream of Bol Park. About 1,300 cfs will be allowed to continue on downstream of the old railroad bridge while 900 cfs will be diverted into the bypass channel. The Barron Diversion Channel will carry 600 cfs that will be added to the bypass bringing the total to 1,500 cfs. The Stanford Channel will add about 200 cfs bringing the total one percent design bypass flow rate to 1,700 cfs.

The existing bike and pedestrian bridge over Matadero Creek will be removed and replaced with a new structure. The new bridge will have two purposes. First, it will provide an enlarged opening for flow passage in Matadero Creek and eliminate the high velocities which have been causing erosion downstream. Second, the bridge deck will be a box girder design that will incorporate the Barron Diversion Channel box culvert and carry its flows directly into the Matadero Bypass Channel. The area surrounding the bridge and bypass intake structure will be carefully graded and revegetated to provide a natural appearance consistent with Bol Park and to minimize visual impacts.

The channel bottom through the bridge will be concrete lined and incorporate a low flow pilot channel for fish passage. The pilot channel will include grouted rock or baffles to create fish resting areas.

During high flows, water from Matadero Creek will begin to enter the Matadero Bypass Channel before water from the Barron Diversion enters Matadero Creek.

Because of the complexity of flow conditions, a hydraulic model study will be done for the Matadero bypass intake area. See Appendix M for an explanation and further details on the hydraulic model study.



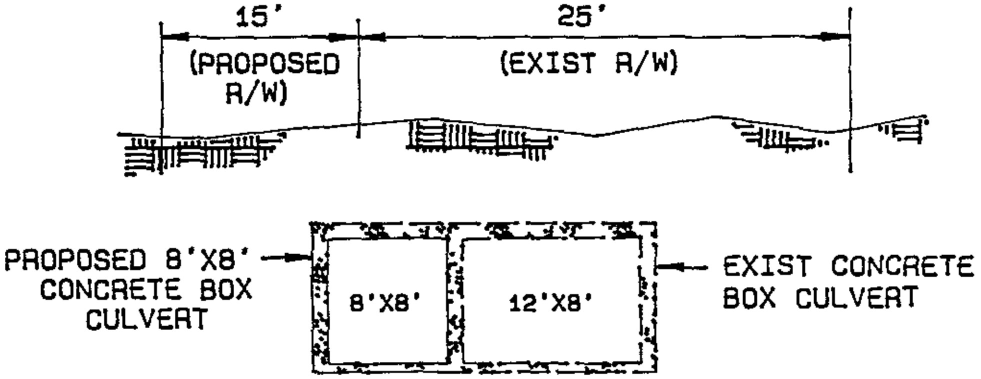
Reach 10: Matadero Creek - Old SPRR Bridge to Hillview Avenue

Reach 10 extends from the downstream side of old SPRR bridge to Hillview Avenue, a total distance of about 2,800 feet. The proposed flood control measures in this reach consist of acquiring easements for maintenance access to the channel and additional capacity to the box culvert under the Watkins-Johnson site.

The most critical point for maintenance access is to the stilling basin at the outlet of the Watkins-Johnson box culvert. An access ramp and easement is proposed from the Veteran's Hospital property to the stilling basin.

Additional capacity to the Watkins-Johnson culvert is proposed by constructing a parallel 8-foot by 8-foot box culvert. The culvert would be built immediately adjacent to the south side of the existing 12-foot by 8-foot culvert. The existing 25-foot wide easement would be widened to 35 feet for the additional culvert. At the upstream end of the culverts a trash rack and safety grate will be added. Due to the nature of the production processes at Watkins-Johnson, special effort will be made to minimize dust generation. Special measures to be taken because of groundwater contamination are discussed in Appendix L.

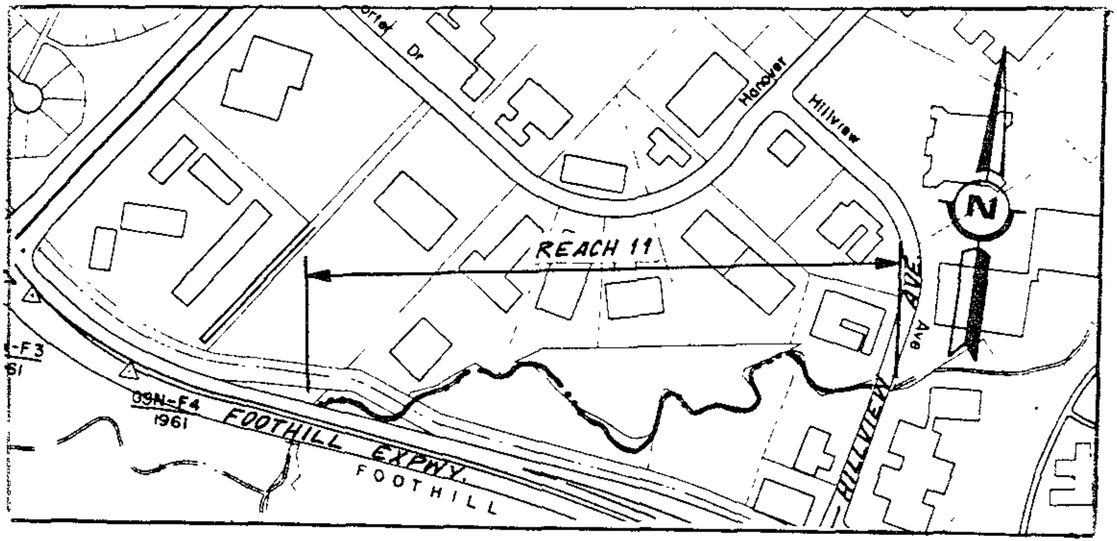
The estimated total cost of measures proposed in Reach 10 is $1.1 million.


15'
(PROPOSED R/W)
25'
(EXIST R/W)
PROPOSED 8'X8' CONCRETE BOX CULVERT
8'X8'
12'X8'
EXIST CONCRETE BOX CULVERT

TYPICAL SECTION

WATKINS-JOHNSON BOX CULVERT

REACH 10 TYPICAL SECTION
MATADERO CREEK: BOL PARK TO HILLVIEW AVENUE

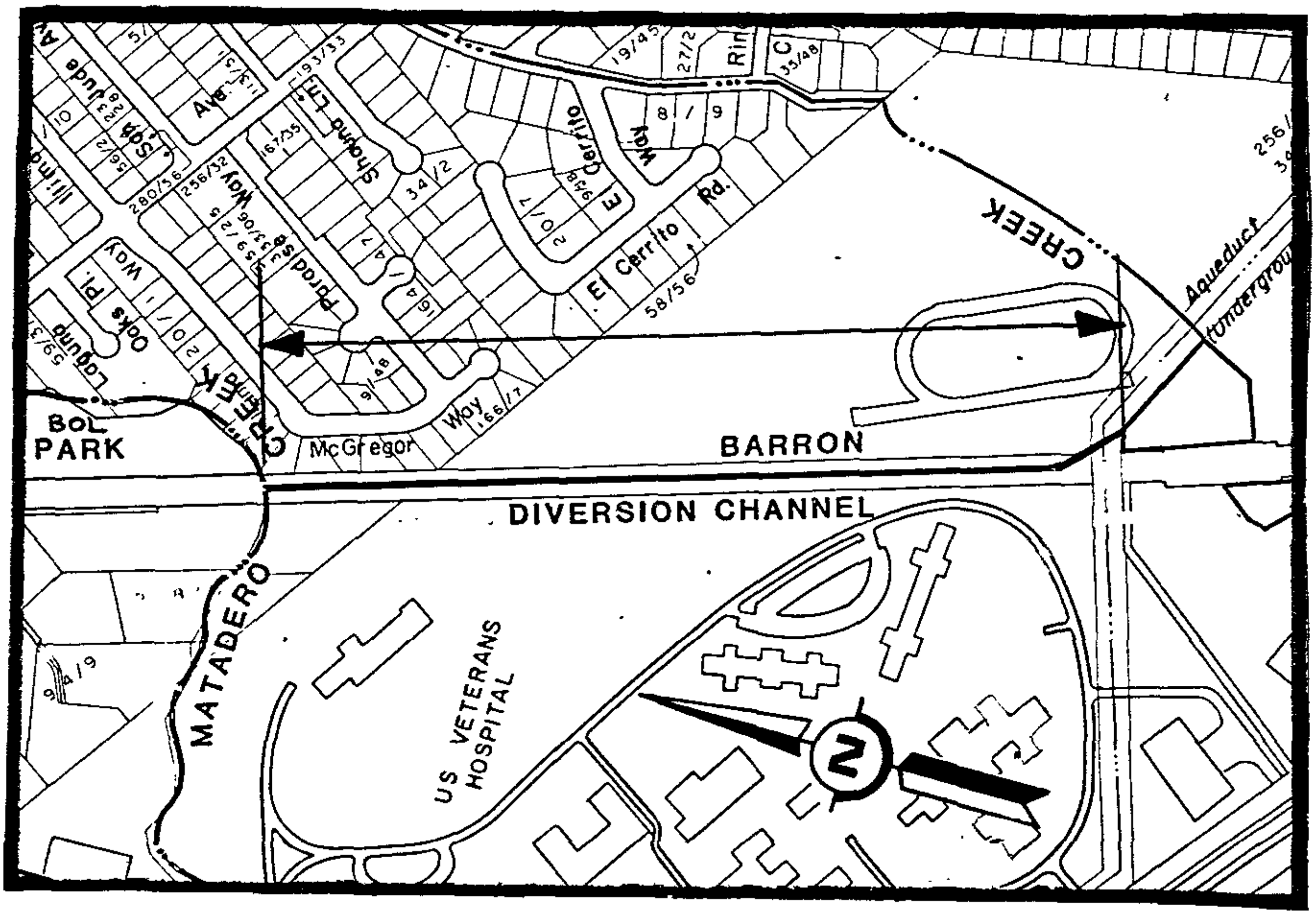


Reach 11: Matadero Creek - Hillview Avenue to Foothill Expressway

Reach 11 extends from the upstream side of Hillview Avenue to the downstream side of Foothill Expressway, a total distance of about 2,100 feet. All of the stream channel in this reach is owned by Stanford University and the District does not have easements or maintenance responsibilities. The proposed measures in this reach consist of acquiring a continuous right of way between Hillview Avenue and Foothill Expressway following the existing natural creek alignment. The easement will extend to a safe setback, averaging ten feet beyond the existing top of banks. In addition, a series of maintenance access ramps will be constructed and ingress-egress easements provided for access. All of the adjacent lands are part of the Stanford Industrial Park. The downstream limits of Reach 11 are bordered by Syntex Corporation to the north, and Sungene Corporation to the south. The upstream portion of the creek is bordered by the Foothills and the University Tennis Clubs.

Sacked concrete erosion repair projects were undertaken by the Syntex and Sungene companies in 1986 to halt severe bank erosion. Approximate total cost of the completed work was $400,000.

The upstream portion of Reach 11 is leased to the University and the Foothill Tennis Clubs. Bank erosion is a problem in this area. Proposed measures include selective erosion repair with gabions and channel widening at critical areas. Estimated cost of measures in this reach is $1.0 million.



Barron Creek Diversion Channel: Barron Creek Sediment Basin to Matadero Creek

This is a special study reach that covers the alignment of the proposed Barron Creek Diversion Channel. The underground diversion channel would be located within the existing 80-foot wide old SPRR right of way that is owned by Stanford and the City of Palo Alto. This reach extends from the Barron Creek sediment basin near Gunn High School to Matadero Creek, a total distance of about 2,000 feet. About 1,600 feet of the total length is owned by Stanford and 400 feet by the City.

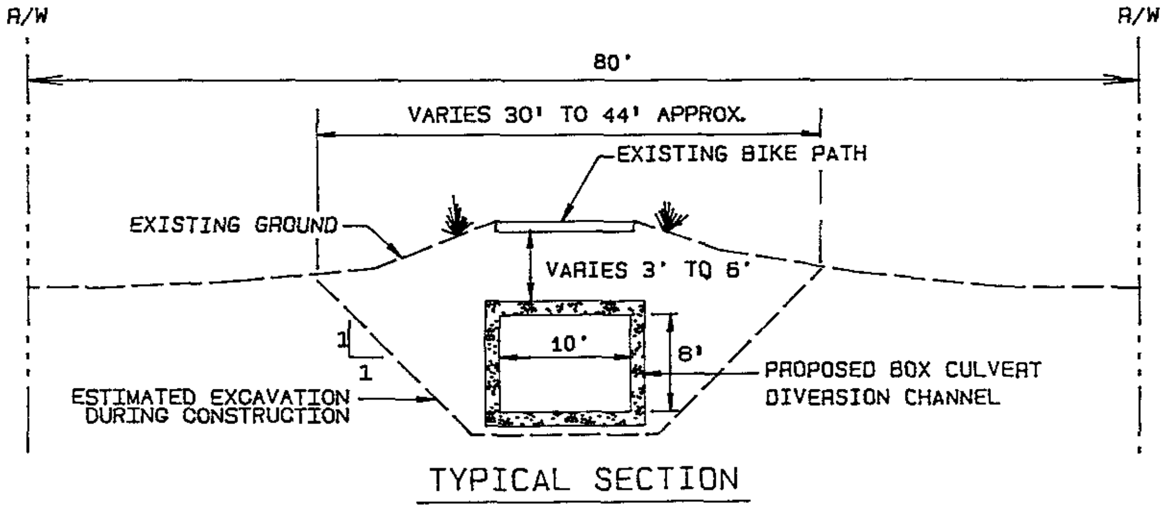
Adjacent land use consists of the U. S. Veterans Hospital to the west and Gunn High School and single family homes to the east. The San Francisco Water Department's Hetch Hetchy pipelines run adjacent to the sediment basins on the northerly side and must be protected during construction of the diversion.

A new overflow structure would be constructed on the northerly levee of the sediment basin. The structure would be designed to discharge high flows out of the Barron Creek basin and into the underground diversion channel. The one percent design condition will allow 160 cfs to flow into Barron Creek downstream of the basin, while the balance (600 cfs) will be diverted across to the Matadero bypass channel.

The Barron Creek diversion concept will work in conjunction with the Matadero Creek bypass alternative. The 1% design flow rate for Matadero Creek is 2,200 cfs at Bol Park while the existing natural stream channel of Matadero Creek can safely convey just 1,300 cfs. Therefore it is necessary to first solve the capacity problem on Matadero before additional flows from Barron Creek can be added. Details of the design concept of the Barron Diversion are explained in Appendix J.

To solve the Matadero flood problem, a bypass channel designed to divert 900 cfs will be provided between El Camino Real and Bol Park. Diverting Barron Creek floodwaters into Matadero bypass will require that 600 cfs additional capacity be provided in the bypass. Providing 600 cfs of incremental capacity in the proposed Matadero Bypass is not difficult nor is the cost excessive. The total flow diverted from Matadero Creek into the bypass is thus (600 + 900) 1,500 cfs. Downstream of El Camino Real, the addition of 600 cfs from Barron Creek will increase the 1% water surface elevation by one-half foot to eight-tenths of a foot. The proposed height of the floodwalls or channel have been correspondingly increased.

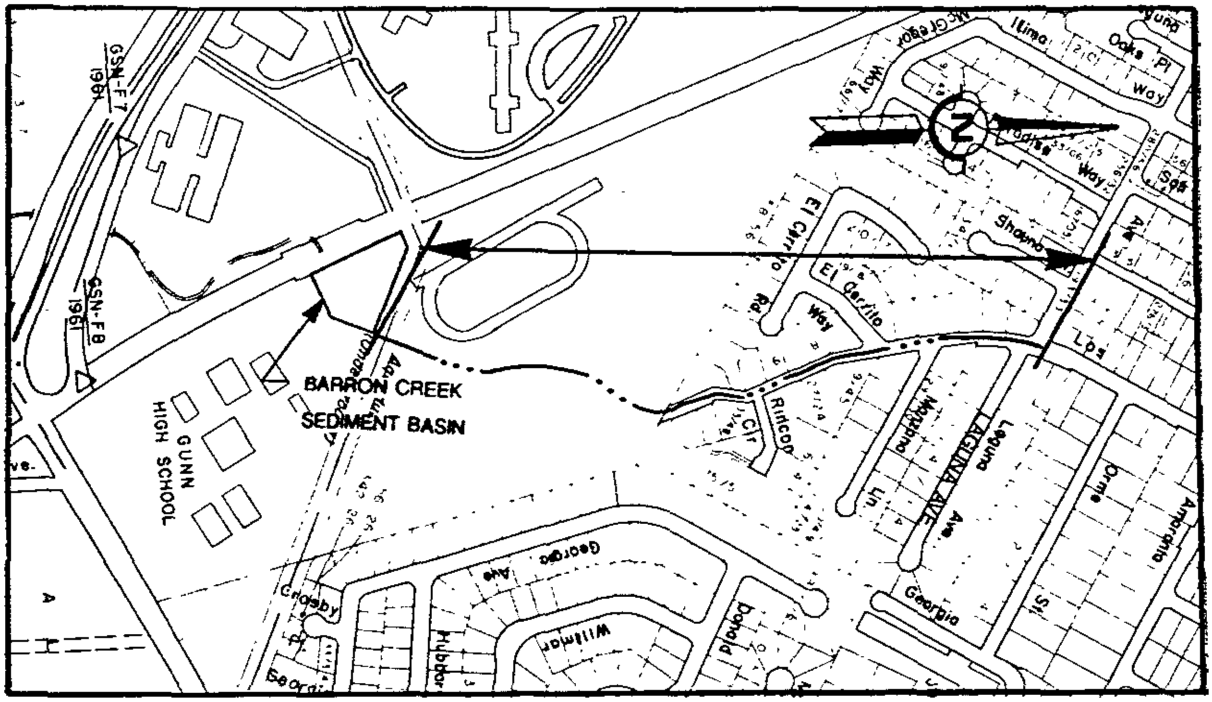
The existing bike path will be closed and bicycle and foot traffic temporarily detoured during construction of the diversion and sediment basin modifications. The proposed detour route will follow the existing path easterly of Gunn High School. The first element of work will be to detour the traffic onto the temporary path. The path will remain there until construction of the diversion channel and sediment basin modifications are complete. Following construction of the underground diversion, a new bike path will be constructed following the existing alignment and the disturbed right of way seeded with grass as mitigation. When construction is completed, the diversion channel will not be visible because it will be underground for its entire length.


R/W
R/W
80'
VARIES 30' TO 44' APPROX.
EXISTING BIKE PATH
EXISTING GROUND
VARIES 3' TO 6'
1
1
10'
8'
PROPOSED BOX CULVERT DIVERSION CHANNEL
ESTIMATED EXCAVATION DURING CONSTRUCTION
TYPICAL SECTION

TYPICAL SECTION
BARRON *DIVERSION:* SEDIMENT BASIN TO MATADERO BYPASS CHANNEL

There are two options for constructing the Barron diversion. Both options include the same inlet structure at the sediment basin and outlet into the Matadero bypass. The first option would utilize a poured-in-place concrete box culvert while the second would employ precast concrete pipe. An advantage of the precast pipe is faster construction.

The estimated cost of the Barron Creek diversion is $2.2 million.



Barron Creek: Laguna Avenue to Sediment Basin

This reach extends from the upstream side of Laguna Avenue to the Barron Creek sediment basin, a total distance of about 2,500 feet. This is the only reach of Barron Creek in the study area that the District does not own right of way and conduct routine maintenance. The proposed measures, therefore, consist only of acquiring right of way along the creek channel and developing a long-term maintenance program. The existing channel will have adequate capacity to safely convey the one percent flood after construction of the Barron Diversion Channel.

The maintenance program guidelines of this reach and the remaining portions of Barron Creek can be found in the Maintenance Program Guidelines chapter.

MAINTENANCE PROGRAM GUIDELINES

To ensure safe and efficient operation of the proposed flood control measures and to continuously evaluate the need for removal of sediment, debris and vegetation, a maintenance program is necessary.

Basic goals of the program include eliminating hazardous conditions and maintaining hydraulic capacity of the system. General tasks to be performed during annual maintenance include removal of sediment, debris, and vegetation; fence repairs, trash removal, weed control and elimination of potentially hazardous conditions.

Because of the significant difference between the downstream and upstream characteristics of the channel, the maintenance program is necessarily different. Following is a detailed reach by reach explanation of the procedures recommended for the project study area. The maintenance issues and performance criteria are summarized in Table 9.

Reach 1: Matadero Creek - Palo Alto Flood Basin to Bayshore Freeway

In this reach, Matadero Creek is a natural channel with flows contained on the northerly side by an earth levee and on the southerly side by a concrete floodwall.

Because of the very wide channel cross section and backwater effects from the flood basin, flow velocities are very low (1 to 4 fps). Consequently, channel roughness due to vegetation does not greatly affect the upstream water surface elevation.

Obstructions to flow will cause an increase in the upstream water surface elevation and therefore debris and trash will be removed from the trunks of trees when the width of the blockage exceeds three feet. The low flow channel along the northerly side of Matadero Creek will be kept free of all debris blockages. Vegetation growth along the banks of the low flow channel need not be removed unless it encroaches into a minimum clear floodway width of approximately 20.

TABLE 9
MATADERO & BARRON CREEKS PLANNING STUDY
MAINTENANCE GUIDELINES FOR REMOVAL OF SEDIMENT & VEGETATION

03/23/88

REACH	CHANNEL TYPE	MAINTENANCE ISSUE	ACCEPTABLE MAINTENANCE LIMIT	PERFORMANCE CRITERIA
1 Flood Basin to *Bayshore Freeway*	Modified Floodplain	Woody vegetation	Trees exceed 4 in dia or 4 ft ht in floodway	Maintain 20 ft wide clear floodway
		Debris Jams	Debris jams obstruct 20-ft clear floodway on north bank	Loosen and remove debris; do not damage mature trees
2 Bayshore Freeway to Greer Road	Sacked Concrete Banks, natural bottom	Emergent Vegetation (Cattails, Bulrushes)	Height of vegetation exceeds 3 feet	Remove all vegetation from channel each Fall
3-6 *Greer Road to* El Camino Real	*Concrete Lined Channel*	*Sediment deposition* in bars	Depth of sediment exceeds 1 foot	Remove local sediments
7-9 El Camino Real to *Bol Park Bike Path*	Natural channel with *local sacked concrete* bank erosion repairs	Debris Jams	Debris on trees *increases overall tree* width by 2 feet	Loosen and remove debris; do not damage mature trees
7B- 9B Matadero Bypass Channel	Underground 12'x12' RCB culvert	Local sediment deposition	Depth of sediment exceeds one foot	Remove local sediments
		scour on invert	*scour exceeds 2 inches*	*Patch local scour*
		Sediment, debris, vegetation at bypass intake area	sediment, debris, or vegetation on trash rack or within 20 feet of intake area	Remove all material from trash rack and bypass intake area
10- 11 Bol Park to Foothill Expwy	Natural channel with 700-ft-long double RCB culvert downstream of Hillview Ave	Bank erosion	Erosion threatens adjacent property	Repair with rock, sack concrete, or gabions
		Woody vegetation	Woody growth exceeds 3 inch diameter or 4 ft *height in invert*	Remove woody growth along 15 ft wide strip *of channel bottom.*
		Debris jams	Debris jam width exceeds 3 feet	Loosen & remove debris from channel
		Sediment Deposition	Sediment depth exceeds *2 feet in Watkins-* Johnson stilling basin	Remove sediment from *stilling basin and* culvert outlet area
Barron Diversion Channel	2000-ft-long underground 10'x6' RCB culvert	Sediment Deposition	Sediment depth exceeds 1 foot	Remove sediment from diversion channel

Maintenance will be conducted by equipment operating from the northerly levee maintenance road. The most critical areas that must remain clear of obstructions to flow are the outlet of the channel under Bayshore Freeway and the downstream end of the reach where Matadero Creek opens into the flood basin.

Reach 2: Matadero Creek - Bayshore Freeway to Greer Road

In this reach, Matadero Creek is an excavated trapezoidal channel with sacked concrete on the banks and a natural bottom. The channel bottom width is 40 feet and overall right of way width is 100 feet. Continuous maintenance roads are located on both banks and are the access points for normal maintenance operations.

This reach is a transition zone between the slow-flowing natural reach downstream of Bayshore Freeway and the steeper and narrower concrete-lined channel upstream of Greer Road. Finer sediments and debris tend to deposit in this reach so their removal is the main feature of the maintenance program.

The concrete maintenance ramp on the southerly bank provides access to the channel below Bayshore Freeway and the frontage roads. Upstream of West Bayshore Frontage Road the channel bottom will remain natural and sediment, debris and vegetation will be removed by equipment operating from the top-of-bank roads.

The most critical area in this reach is the section under Bayshore Freeway. Debris will be removed from the nose of the bridge pier when it exceeds a total width of four feet. Sediment will be removed when it reaches an elevation of -2.0, a depth of two feet above the concrete-lined bottom. Where the channel bottom is natural or sediment has deposited beneath Bayshore Freeway, emergent vegetation will grow and should be completely removed each fall before the rainy season.

Reaches 3 and 4: Matadero Creek - Greer Road to Alma Street

Matadero Creek is a concrete-lined channel in these reaches and consists of a trapezoidal section of bottom widths varying from 20 feet downstream of Louis Road to nine feet upstream of Cowper Street. From Louis Road to Cowper Street the bottom width is 13 feet.

Sediment deposition could occur anywhere along these reaches but is most likely downstream of Ross Road because of the mild slope. When an average sediment depth of one foot is reached, material will be removed. Emergent vegetation may become established in areas of sediment buildup. Both vegetation and sediment will be removed when height of the growth exceeds four feet. The upstream side of the bridge piers at Greer Road should be regularly inspected and all debris removed from the pier noses.

Reach 5: Matadero Creek - Alma Street to Park Boulevard

In this reach, the Matadero Creek channel consists of a proposed 25-foot-wide rectangular concrete-lined channel. Flow velocities in this reach are moderate (10 fps) so sediment deposition should not be a problem except at the channel bends.

The most critical area is the culvert under SPRR. Debris should be removed from the nose of the splitter wall upstream of SPRR as soon as possible. This area should remain clear to provide the best possible flow conditions around the bend and at the SPRR culvert.

Sediment should be removed from the channel bottom when the depth exceeds one foot.

Maintenance will be conducted from the channel bottom with access from proposed ramps upstream of Park Boulevard and downstream of Alma Street.

Reach 6: Matadero Creek - Park Boulevard to El Camino Real

The Matadero Creek channel in this reach is a proposed 25-foot-wide rectangular section. Maintenance will be conducted from the channel bottom. Access will be from ramps located upstream and downstream of Lambert Avenue. Flow velocities in this reach are moderate however, because this reach is immediately downstream from the natural channel, significant amounts of sediment and debris will continue to deposit here. Sediment will be removed when it reaches a depth of one foot.

Reaches 7B, 8B, 9B: Matadero Bypass Channel - Bol Park to El Camino Real Confluence

The Matadero bypass channel is an underground 12-foot by 12-foot box culvert that carries high flows around the natural stream channel from Bol Park to El Camino Real. Flow velocities in the bypass are generally high (11 fps in Reach 7B and 8B and 15 fps in Reach 9B during a 10-year event: 660 cfs). The diversion structure at the bypass intake has been designed so that the natural channel will convey the bedload of the creek.

Maintenance access to the bypass channel is provided by ramps downstream of El Camino Real and near the inlet of the bypass at Bol Park.

It is expected that maintenance of the bypass will be negligible because there should be no deposition of material and the channel is concrete-lined. If sediment deposits in the bypass it will be removed when the depth exceeds one foot. The most critical area to be checked and maintained is the diversion structure at the inlet. This area must be kept free of debris, vegetation growth, and sediment accumulation. The area should be inspected each fall and all vegetation, sediment, or debris lying within 30 feet of the intake removed from within the natural channel. All debris should be removed from the trash rack at the intake. This rack should be inspected periodically through the rainy season.

Reaches 7, 8, 9: Matadero Creek - El Camino Real to Bol Park

This portion of Matadero Creek is a natural stream channel that is bordered by homes along the banks and Bol Park on the upstream northerly bank. Maintenance access ramps are located just downstream of Matadero Avenue, at the Hoover Elementary School, and at the upstream end of Bol Park.

The primary concern along this stretch of channel has been erosion. Much of the creek has been lined with sacked concrete to provide erosion protection. The creek should be monitored for erosion, debris jams and vegetation growth.

The most critical stretch of channel in terms of flow carrying capacity is Matadero Avenue to El Camino Real. The channel is narrow and has several large oaks growing along the banks just downstream of Matadero Avenue. Debris jams or heavy growth of vegetation should be removed to allow floodwaters to pass unimpeded. Mature vegetation such as the large oak trees should not be disturbed but debris that accumulates on the trees should be removed to provide for maximum flow capacity.

Reach 10: Matadero Creek - Bol Park to Hillview Avenue

The most critical area in this reach is the stilling basin at the outlet of the Watkins-Johnson culvert. Debris and sediment deposits in the basin will be removed prior to the rainy season when a depth of two feet is exceeded. Access to the basin is provided by a ramp located on the V. A. Hospital side of the creek. The stilling basin is a natural trap for sediment that originates upstream of Hillview Avenue in the erosive channel areas.

Reach 11: Matadero Creek - Hillview Avenue to Foothill Expressway

This portion of the creek is a severely meandering and actively eroding channel. The local velocities during moderate flows can reach 10 feet per second. Areas that should be carefully monitored for erosion include the bends, downstream of the University Club culvert, and near the Hetch Hetchy crossing. Access ramps are provided at two locations via the University Club Parking Lot.

Barron Creek - Adobe Creek Confluence to Louis Road

This portion of Barron Creek was covered in the June 1985 Adobe Creek Planning Study. With the proposed Barron Diversion channel, the flow rates in this reach will be limited to about 200 cfs during a 1% flood. The water surface will be controlled by backwater from Adobe Creek and the flood basin and flow velocities will generally be very low (1 fps to 5 fps depending on flood basin pool level).

Routine maintenance will consist of removing sediment when a depth of two feet is exceeded and inspecting the earth slopes for instability. Maintenance will be conducted from the south bank maintenance road.

Barron Creek - Louis Road to Laguna Avenue

This reach of Barron Creek has been previously modified and is a combination of concrete channel and underground pipe. From Louis Road to El Camino Real, the creek channel is a trapezoidal concrete-lined section with a five-foot bottom width. Because the channel is lined, there will be no erosion problems. With the upstream sediment basin, there will be minimal need for sediment and debris removal but this is the primary feature of the program. Because the reach upstream of Laguna Avenue is natural, some sediment will be transported downstream.

From El Camino Real to Laguna Avenue, the creek follows below Los Robles Avenue in an underground pipe. The pipe will be inspected annually for sediment and debris removal. At the upstream end is a trashrack that must be kept free of large debris. Smaller debris normally passes through the rack and the downstream pipe.

Barron Creek - Laguna Avenue to Sediment Basin

This reach of Barron Creek consists of a semi-natural channel from Laguna Avenue to Gunn High School. The reach that runs across Gunn High School is an underground pipe with a high flow swale above.

Maintenance measures in the natural channel between Laguna Avenue and Gunn High School consist of removing major obstructions to flow such as fallen trees or debris. This reach of channel has much greater capacity than the downstream 60-inch pipe so it is the pipe and its intake that control the flow capacity and upstream backwater. All loose debris and vegetation should be removed prior to the rainy season so that it will not obstruct the intake or trash rack of the pipe. Maintenance will be conducted from Los Robles Avenue. It is not necessary to remove well-rooted vegetation from the banks. However, debris jams that may occur on the vegetation will be removed.

Maintenance measures in the underground pipe across Gunn High School will consist of annual inspection and removal of debris or sediment. There should be very little sediment in this reach because of the upstream sediment basin. No special

PROJECT COST, FINANCING AND CONSTRUCTION STAGING

The estimated total first cost of all proposed flood control measures is $21 million and includes all costs for engineering, construction, right of way, inspection, and administration.

The proposed measures will be financed through two existing sources of revenue: (1) the Northwest Flood Control Zone's allocation of the 1% property tax, and (2) Northwest Flood Control Zone Benefit Assessments.

Construction will be staged over five years to minimize disruption to the community, particularly traffic circulation. Work will progress from downstream to upstream.

The estimated construction schedule is shown in Table 10. As indicated, construction will begin in fiscal year 1988 and be completed by fiscal year 1993.

TABLE 10

MATADERO AND BARRON CREEK FLOOD CONTROL PROJECT ESTIMATED CONSTRUCTION SCHEDULE (March 1988)

Reach	Limits	Proposed Measures	Estimated Total Cost	Estimated Date of Construction
1	Flood Basin to Bayshore Fwy	Long-term maintenance program	$ 0	
2	Bayshore Fwy to Greer Road	Floodwall addition	$ 468,000	1988/1989
3	Greer Road to Cowper Avenue	Floodwall addition, culvert replacement	$3,300,000	1988/1989
4	Cowper Avenue to Alma Street	Channel and culvert replacement	$1,412,000	1989/1990
5	Alma Street to Park Boulevard	Channel and culvert replacement	$1,838,500	1989/1990
6	Park Boulevard to El Camino Real	Channel and culvert replacement	$2,539,000	1990/1991
7,8,9	El Camino to Bol Park	Long-term maintenance	$ 75,060	1991/1992
Bypass	El Camino Real to Bol Park	Bypass channel (underground)	$6,690,000	1991/1992
Diversion	Barron Creek to Matadero Creek	Diversion channel (underground)	$2,205,650	1991/1992
10	Bol Park to Hillview Ave.	Maintenance access ramps, W-J Culvert	$1,140,000	1992/1993
11	Hillview Avenue to Foothill Exp.	Erosion repair, maintenance ramps	$1,020,000	1992/1993
Barron Creek	Laguna Ave. to Sediment Basin	Long-term maintenance program and right of way acquisition	$ 100	1992/1993
	Estimated Total Project Cost		$21 million	

CONCLUSIONS AND RECOMMENDATIONS

The existing flood carrying capacities of Matadero and Barron Creeks are considerably less than the one percent design flow rate. Many of the existing culverts along both creeks are significant bottlenecks in the system and cause flooding at intervals ranging from an average of once in four years to once in 15 years. Both creeks flooded in 1983 at several locations.

Because of the inadequate flood carrying capacities, Matadero and Barron Creeks have the potential to flood over 4,000 single family homes, 300 commercial and industrial buildings and six public schools resulting in an estimated combined one percent damage of over $28 million. Long-term average annual flood damages of $1.2 million per year could be expected for the combined floodplain of both creeks.

The proposed flood control project would make modifications to Matadero Creek to safely convey the one percent design flow rate. Measures proposed downstream of El Camino Real consist of replacing inadequate culverts, adding floodwalls in some reaches and replacing the inadequate concrete channel upstream of Cowper Avenue. Between El Camino Real and Bol Park, an underground bypass channel would carry high flows around the inadequate natural stream channel.

By providing additional flood carrying capacity in the Matadero bypass and proposed channel downstream of El Camino Real, high flows from Barron Creek could be conveyed by the Matadero system. To accomplish this objective an underground diversion channel would be constructed between the Barron Creek sediment basin and the Matadero bypass along the old SPRR right of way. The diversion would be located below the existing bike path.

The proposed project will provide one percent flood protection to both Matadero and Barron Creeks, improve local drainage, save $7 million over what it would cost to improve both flood carrying systems independently, accelerate the construction schedule for critical flood control projects in the Northwest Zone, and minimize overall impacts to the community, traffic and the environment.

The project is estimated to cost $21 million and could be financed using existing revenue sources and debt financing.

When the flood damage potential and the cost savings over independent projects is considered, it is apparent that the proposed flood control project is not only needed but provides the least overall impacts, the best overall economics and would accelerate needed flood protection in other areas of the Northwest Flood Control Zone. Therefore, it is recommended that the measures described in the report be approved and construction plans prepared for implementation of the project.

Robert R. Smith, RCE No. 17781
Flood Control Manager

APPENDICES

APPENDIX A

List of Technical Terms

Ad Valorem Tax - A tax based on property value.

Amortization - The process of liquidating a debt by installment payments or payment into a sinking fund; to prorate over a defined period at a specified interest rate.

Benefit Assessment - Revenues that supplement other available but limited revenues sufficiently to keep the existing flood protection system in a safe and effective condition, to perform maintenance and repair, to provide for needed new flood control construction, and in general to provide all flood control services to the public. The assessments are levied in proportion to benefits received, that is, on the basis of proportionate storm water runoff from each parcel. The assessment per single family residence is uniform zonewide ($40.00 per year in 1987).

Bypass Channel - A parallel auxiliary channel designed to supplement an existing creek or channel's flood carrying capacity.

CEQA - California Environmental Quality Act.

Confluence - The junction of two streams.

Cubic Foot Per Second - A rate of flow equivalent to one cubic foot, about 7-1/2 gallons, passing a point during one second (approximately 450 gallons/minute).

dBA - Decibel, a unit for measuring the volume of a sound.

Design Flow - The magnitude of streamflow that is used in design of channel modifications and structures across channels.

Diversion Channel - As perpendicular channel designed to divert all or a portion of flow from one flood carrying system to another.

EIR - Environmental Impact Report.

Freeboard - Vertical distance between the top of an embankment adjoining a channel and the water level in the channel. It is a factor of safety designed into a project.

Floodwaters - Those flows of water that cannot be contained within the natural stream channel.

Floodplain - A wide, gentle sloping area subject to periodic flooding from flood flows.

Gabion - A wire mesh rectangular basket filled with uniformly sized rocks.

Lead Agency - The public agency which has the principal responsibility for carrying out or approving a project.

Levees - Earth embankments that are constructed to contain flood flows. In this project there are existing levees (part of the existing creek) and proposed levees (part of the proposed flood control project).

NGVD - National Geodetic Vertical Datum (1929 Mean Sea Level Datum)

One Percent (1%) Flood - The flood that has a one percent chance of being equalled or exceeded in any one year. (See Appendix E).

Reach - A subdivision of the creek for convenience of study and reference.

Responsible Agency - A public agency other than the lead agency which has responsibility for carrying out or approving a project.

Riparian - Vegetation and wildlife living within and immediately adjacent to a river, stream or lake. In this report, riparian means the creek environment.

Rock Lining - Also called riprap, this is a measure commonly used to protect against erosion of earth banks or creek bottoms. In this project most rock-lined areas will also be filled with soil and revegetated.

Roughness Coefficient - Represents the frictional resistance of a surface to the flow of water; used in hydraulic computations.

Watershed - The geographical region or area drained by a stream. Also referred to as a basin.

APPENDIX B

Persons to Contact for More Information

About This Report

Keith Whitman, Project Engineer, Matadero Creek Planning Study
Santa Clara Valley Water District
265-2600

About Flood Insurance

Randy Talley, Predesign Division Engineer
Santa Clara Valley Water District
265-2600

About Environmental Considerations

Dr. Bernard Goldner, Environmental Specialist
Santa Clara Valley Water District
265-2600

About Creek Maintenance

Donald Erling, Chief of Maintenance
Santa Clara Valley Water District
265-2600

About Land Acquisition/Dedication

Vincent Lico, Real Estate Division Head
Santa Clara Valley Water District
265-2600

About Detailed Design and Construction

James Fiedler, Design Division Engineer
Santa Clara Valley Water District
265-2600

About Local Storm Drains

Dave Matson, Public Works Department
City of Palo Alto
(415) 329-2296

APPENDIX C

The One Percent Flood

The one percent flood is that flow of water from a drainage area that has a one percent chance (probability of 0.01) of occurring in any given year. It is equivalent to the so-called 100-year flood, but it should not be thought of as an event that occurs regularly every 100th year. Instead, it is the flood flow event that would be equaled or exceeded about 100 times in 10,000 years. It is also possible that two repetitions of this flood flow could occur in a single year, or that a single event may not occur even once in 200 years.

The "one percent flood" is the preferred description of the design flood. However, the term "100-year flood" is equivalent. Unfortunately, this latter term often leads to the misconception that the design flood occurs only every 100th year.

Another terminology problem is the relation of the one percent storm and the one percent flood. The storm magnitude relates to the flood magnitude through a complex set of parameters such as antecedent rainfall conditions, drainage basin shape, length, slope, orientation, and others. Therefore, a one percent storm will not necessarily produce a one percent flood. The one percent flood should not be confused with the one percent storm, nor should it be referred to as the one percent storm flood.

The one percent flood has a small chance of occurrence in a given year, but this risk is cumulative. When compared with the 30-year life of the average home loan, for example, the chance that it will occur is quite large. During the 30-year loan period, the chance that a one percent flood will occur, or be exceeded, approaches 30 percent.

The magnitude of the one percent flood must be calculated by using statistical hydrological (stochastic) methods. Since it is the desire of the District to provide equal protection from flooding to all residents, a uniform method of determining design flood flows is required; one that is regional in scope and one that minimizes the chance of providing unequal protection from one area to another. This objective is reached through a regional peak flood frequency analysis that uses the best available hydrologic data from stream systems in and adjacent to the District. The regional process utilized by the District was developed after considerable effort and has been reviewed and approved by the academic and professional community.

The research on the statistical measurement of flood flows and frequencies has shown that the larger magnitude floods that occur at relatively infrequent intervals, such as the one percent flood, are products of extremely heavy rainfalls, either of exceptionally high intensity or of long duration. With exceptionally high-intensity rainfall, so much rain falls in a short period of time that no matter what the ground cover is - soil, pavement, grass, trees, or buildings - the water cannot be stored or soaked up, and it runs off in a flood. With long-duration rainfall, a lot of rain falls, but it comes over a long period of time. Bare soil, grassland, forests, landscaping, house roofs, and pavement become fully saturated, and flooding occurs when no more water can be absorbed, stored, or evaporated.

Thus, for large floods, the type of development or degree of urbanization existing in the watershed is of little consequence.

However, the situation is different for the small magnitude floods, which occur at frequent intervals. In these, the rainfall intensity is less or of shorter duration. The absorption, holding, or storage characteristics of the land are much more important. With much less water present, soil, grass, and forests tend to soak up and hold back the rain that falls, while pavement and house roofs let a large percentage run off.

Therefore, when grassland is converted to pavement, the amount of water that runs off is much greater for the small amounts of rainfall. The magnitude of the small, more frequent type of flood flow is increased by urbanization.

In discussing flood flows and urbanization, one additional factor should be mentioned. This is over-bank storage in floodplain areas. Where urbanization occurs in the floodplain and the stream is channel, the storage of overbank floodwater is reduced.

This reduction results in greater downstream flood flows. This increase in flood flows occurs for any magnitude of frequency of flooding that would have resulted in channel overflow and storage of water in the floodplain.

Lloyd C. Fowler
27 June 1974

APPENDIX D

Organizations and Persons Contacted During Preparation of this Report

Mr. Jim Harrington
Department of Public Works
City of Palo Alto

Mr. David Matson
Department of Public Works
City of Palo Alto

Ms. Gayle Likens
Transportation Department
City of Palo Alto

Mr. Doug Pursell
Utilities Department
City of Palo Alto

Ms. Sarah Cheney
Planning Department
City of Palo Alto

Mr. Ashok Aggarwal
Transportation Department
City of Palo Alto

Mr. Tom Habashi
Utilities Department
City of Palo Alto

Mr. Larry Starr
Chief Engineer, Light and Power
City of Palo Alto

Mr. David Burnham
Manager of Facilities
Watkins-Johnson, Inc.

Mr. Mark Wilson
California Regional Water
Quality Control Board

Mr. Clifton Davenport
Department of Health Services
State of California

Mr. Kenneth Schreiber
Director of Planning and
Community Environment

Mr. K. B. Derr
Southern Pacific Transportation Co.
Oakland, CA

Mr. Ed Fonseca
San Francisco Water Department
Milbrae, CA

Mr. Ted Noguchi
Department of Public Works
City of Palo Alto

Mr. John Joynt
President
Barron Park Association

Mr. Don Sarouhan
Vice Principal
Henry Gunn High School

Mr. Kirt Pruyne
Lands Management
Stanford University

Mr. Mike McCoy
Manager Services
Varian Associates

Ms. Margaret Fish Cornell
Manager
University Club of Palo Alto

Ms. Paula Kakimoto
Lands Management
Stanford University

Mr. George Kleevic
U.S. E.P.A., Washington, D.C.
(800) 424-9346

APPENDIX E

Detailed Cost Estimate

03-01-88
FINAL

MATADERO CREEK
REACH 2: Bayshore Freeway to Greer Road

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Lining (Hwy 101)	$200	C.Y.	438	$87,600
Excavation	$7	C.Y.	383	$2,681
Armor. Aggr. (Maint. Rds.)	$20	C.Y.	710	$14,200
Sack Conc Remove & Replace	$20,000	L.S.	1	$20,000
Rock	$45	C.Y.	60	$2,700
Struct. Conc. (Floodwalls)	$400	C.Y.	475	$190,000
Earth Fill (Floodwalls)	$7	C.Y.	131	$917
Outfall Modification	$4,000	Each	4	$16,000

SUBTOTAL	$334,098
MOBILIZATION (8%)	$26,728
CONSTRUCTION CONTINGENCIES (10%)	$33,410
CONSTRUCTION COSTS	$394,236
ENGINEERING, DESIGN, ADMIN.INSP (18%)	$70,962
TOTAL COSTS	$465,198

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FINAL

MATADERO CREEK
REACH 3: Greer Road to Cowper Street

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Lining	$200	C.Y.	205	$41,000
Struct. Conc. (Floodwalls)	$400	C.Y.	1509	$603,600
BRIDGE REPLACEMENT				
GREER ROAD				
Bridge Demolition	$150	C.Y.	306	$45,900
Bridge Replacement	$80	S.F.	3355	$268,400
Lining Removal @ Bridge	$100	C.Y.	35	$3,500
Channel Lining @ Bridge	$200	C.Y.	298	$59,600
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement	$5	S.F.	2623	$13,115
Curb & Gutter	$15	L.F.	122	$1,830
Sidewalk	$6	S.F.	732	$4,392
Utility Relocation	$10,000	Each	3	$30,000
Outfall Modification	$4,000	Each	2	$8,000
LOUIS ROAD				
Bridge Demolition	$150	C.Y.	193	$28,950
Bridge Replacement	$80	S.F.	2256	$180,480
Lining Removal @ Bridge	$100	C.Y.	29	$2,900
Channel Lining @ Bridge	$200	C.Y.	170	$34,000
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement	$5	S.F.	1839	$9,195
Curb & Gutter	$15	L.F.	69	$1,035
Sidewalk	$6	S.F.	416	$2,496
Utility Relocation	$10,000	Each	1	$10,000
Outfall Modification	$4,000	Each	3	$12,000
ROSS ROAD				
Bridge Demolition	$150	C.Y.	178	$26,700
Bridge Replacement	$80	S.F.	2600	$208,000
Lining Removal @ Bridge	$100	C.Y.	20	$2,000
Channel Lining @ Bridge	$200	C.Y.	202	$40,400
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement	$5	S.F.	2120	$10,600
Curb & Gutter	$15	L.F.	80	$1,200
Sidewalk	$6	S.F.	480	$2,880
Utility Relocation	$10,000	Each	2	$20,000
Outfall Modification	$4,000	Each	1	$4,000
MIDDLEFIELD ROAD				
Bridge Demolition	$150	C.Y.	200	$30,000
Bridge Replacement	$80	S.F.	3600	$288,000
Lining Removal @ Bridge	$100	C.Y.	23	$2,300
Channel Lining @ Bridge	$200	C.Y.	191	$38,200
Traffic Control	$75,000	C.Y.	1	$75,000
AC Pavement	$5	S.F.	3120	$15,600

Curb & Gutter	$15	L.F.	80	$1,200
Sidewalk	$6	S.F.	480	$2,880
Utility Relocation	$10,000	Each	2	$20,000
PG&E 24-in HP Gas Line	$30,000	Each	1	$30,000

SUBTOTAL	$2,329,353
MOBILIZATION (8%)	$186,348
CONSTRUCTION CONTINGENCIES (10%)	$232,935
CONSTRUCTION COSTS	$2,748,637
ENGINEERING, DESIGN, ADMIN.INSP (18%)	$494,755
TOTAL COSTS	$3,243,391

03-01-88
FINAL

MATADERO CREEK
REACH 4: Cowper Street to Alma Street

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Lining-new chnl	$300	C.Y.	264	$79,200
Concrete Removal-old chnl	$50	C.Y.	168	$8,400
Excavation	$7	C.Y.	610	$4,270
Struct. Conc. (Floodwalls)	$400	C.Y.	646	$258,400
BRIDGES				
COWPER STREET				
Bridge Demolition	$150	C.Y.	131	$19,650
Bridge Replacement	$80	S.F.	1600	$128,000
Lining Removal @ Bridge	$100	C.Y.	24	$2,400
Channel Lining @ Bridge	$200	C.Y.	143	$28,600
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement	$5	S.F.	1120	$5,600
Curb & Gutter	$15	L.F.	80	$1,200
Sidewalk	$6	S.F.	480	$2,880
Utility Relocation	$10,000	Each	4	$40,000
Outfall Modification	$4,000	Each	0	$0
WAVERLY STREET				
Bridge Demolition	$150	C.Y.	157	$23,550
Bridge Replacement	$80	S.F.	2557	$204,560
Lining Removal @ Bridges	$100	C.Y.	29	$2,900
Channel Lining @ Bridges	$200	C.Y.	171	$34,200
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement	$5	S.F.	2106	$10,530
Curb & Gutter	$15	L.F.	75	$1,125
Sidewalk	$6	S.F.	451	$2,706
Utility Relocation	$10,000	Each	4	$40,000
Outfall Modification	$4,000	Each	0	$0
	SUBTOTAL			$998,171
MOBILIZATION (8%)				$79,854
CONSTRUCTION CONTINGENCIES (10%)				$99,817
CONSTRUCTION COSTS				$1,177,842
ENGINEERING, DESIGN, ADMIN.INSP (18%)				$212,012
TOTAL COSTS				$1,389,853

FINAL 03-01-88

MATADERO CREEK
REACH 5: Alma Street To Park Blvd.

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Removal(old chnl)	$50	C.Y.	258	$12,900
Balanced Cut & Fill	$7	C.Y.	5965	$41,755
Excavation	$5	C.Y.	5045	$25,225
Struct. Conc. (U-Frame)	$400	C.Y.	1005	$402,000
BRIDGE REPLACEMENT				
Extension of 6x6 RCB SD	$400	C.Y.	219	$87,600
10-in Water Line Reloc	$10,000	L.S.	1	$10,000
Traffic Management	$50,000	L.S.	1	$50,000
SPRR Bore/Jack RCB Culvert	$500,000	L.S.	1	$500,000
MISCELLANEOUS				
Utilities	$10,000	Ea.	6	$60,000
Outfall Modifications	$4,000	Ea.	2	$8,000
Revegetation	$25,000	L.S.	1	$25,000
Chain Link Fence	$10	L.F.	1600	$16,000
Shoring- U-Frame @ Substa	$7	S.F.	8625	$60,375

SUBTOTAL	$1,298,855
MOBILIZATION (8%)	$103,908
CONSTRUCTION CONTINGENCIES (10%)	$129,886
CONSTRUCTION COSTS	$1,532,649
RIGHT OF WAY	
ENGINEERING, DESIGN, ADMIN.INSP (18%)	$275,877
TOTAL COSTS	$1,808,526

FINAL
03-01-88

MATADERO CREEK
REACH 6: Park Blvd To El Camino Real

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Removal	$50	C.Y.	960	$48,000
Balanced Cut & Fill	$7	C.Y.	6571	$45,997
Fill	$10	C.Y.	5976	$59,760
Struct. Conc.(U-Frame)	$400	C.Y.	2519	$1,007,600
BRIDGES				
Park Blvd.				
Bridge Demolition	$150	C.Y.	146	$21,900
Bridge Replacement	$80	S.F.	1375	$110,000
Lining Removal @ Bridge	$100	C.Y.	28	$2,800
Traffic Control	$50,000	Each	1	$50,000
AC Pavement Removal	$2	C.Y.	15000	$30,000
AC Pavement	$5	S.F.	15000	$75,000
Curb & Gutter	$15	L.F.	600	$9,000
Sidewalk	$6	S.F.	3600	$21,600
Utility Relocation	$10,000	Each	3	$30,000
Outfall Modification	$4,000	Each	2	$8,000
Lambert Ave.				
Bridge Demolition	$150	C.Y.	189	$28,350
Bridge Replacement	$80	S.F.	2000	$160,000
Lining Removal @ Bridge	$100	C.Y.	39	$3,900
Traffic Control	$50,000	L.S.	1	$50,000
AC Pavement Removal	$0	C.Y.	49	$0
AC Pavement	$5	S.F.	2000	$10,000
Curb & Gutter	$15	L.F.	50	$750
Sidewalk	$6	S.F.	150	$900
Utility Relocation	$10,000	Each	2	$20,000
Outfall Modification	$4,000	Each	0	$0
	SUBTOTAL			$1,793,557
MOBILIZATION (8%)				$143,485
CONSTRUCTION CONTINGENCIES (10%)				$179,356
CONSTRUCTION COSTS				$2,116,397
ENGINEERING, DESIGN, ADMIN.INSP (18%)				$380,952
TOTAL COSTS				$2,497,349

07-29-87
DRAFT

MATADERO CREEK
REACH 7 thru 9:El Camino Real to Bol Pa

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Gabion Lining (bike brdge)	$200	C.Y.	100	$20,000
Gunite Removal	$100	C.Y.	75	$7,500
Earth Berms (Matadero Av)	$10	C.Y.	200	$2,000
Sack Conc Remove & Replace	$20,000	L.S.	0	$0
Rock Rip Rap (bike brdge)	$45	C.Y.	50	$2,250
Struct. Conc. (Floodwalls)	$400	C.Y.	0	$0
Earth Fill (Floodwalls)	$7	C.Y.	0	$0
Outfall Modification	$4,000	Each	0	$0
SUBTOTAL				$31,750
MOBILIZATION (8%)				$2,540
CONSTRUCTION CONTINGENCIES (10%)				$3,175
CONSTRUCTION COSTS				$37,465
RIGHT OF WAY ACQUISITION				
Reach 7: Creek along 2 lot	$100	Acre	0.5	50
Reach 8:	$100	Acre	0	0
Reach 9: South bank of crk	$100	Acre	0.1	10
ENGINEERING, DESIGN, ADMIN.INSP (18%)				$37,525
TOTAL COSTS				$74,990

03-01-88
MAT-BYPA

MATADERO CREEK BYPASS CHANNEL
REACHES 7B, 8B & 9B

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
CLEAR & GRUB	$5,000	ACRE	3.3	$16,500
EARTHWORK:				
Excavation	$7	C.Y.	29,649	$207,543
Balanced Cut & Fill	$3	C.Y.	30,257	$90,771
CHANNEL MODIFICATIONS				
Struct Conc (12x12 RCB)	$400	C.Y.	8,497	$3,398,800
Concrete Removal- (84-in. Stanford RCP)	$100	C.Y.	1,000	$100,000
ROADWAY REPLACEMENT				
Asphalt Pavement-				
City of P.A. bike path	$3	S.F.	23,000	$69,000
Varian Parking Lot	$5	S.F.	40,000	$200,000
Asphalt Removal-				
City of P.A. bike path	$25	C.Y.	350	$8,750
Varian Parking Lot	$25	C.Y.	10,000	$250,000
MITIGATION	---	L.S.	----	$100,000
Reveg, irrigation, 2 year maintenance				
MISCELLANEOUS				
Shoring	$8	S.F.	25,000	$200,000
Remv & Repl Varian Wall	$100	Panel	10	$1,000
Noise control Mgmt	---	L.S.	---	$35,000
Traffic Management	---	L.S.	----	$25,000
Install Temporary Fencing	$9	L.F.	3,000	$27,000
Remove Temporary Fencing	$2	L.F.	3,000	$6,000
UTILITY RELOCATION				
Gas, Water, Sewer Lines	$10,000	EA.	10	$100,000
Outfalls (Stanford Channel)	$10,000	EA.	2	$20,000
Remv & Repl Electroliers	$5,000	EA.	3	$15,000
Line for Electroliers	$10	L.F.	600	$6,000
	SUBTOTAL			$4,853,864
MOBILIZATION (8%)				$388,309
CONSTRUCTION CONTINGENCIES (10%)				$485,386
CONSTRUCTION COSTS				$5,727,560
RIGHT OF WAY (Bypass Ch)	$100	Acre	2.3	$230
ENGINEERING, DESIGN, ADMIN.,INSP (18%)				$1,030,961
TOTAL COSTS				$6,758,520

03-01-88
FINAL

MATADERO CREEK
REACH 10: Bol Park to Hillview Ave.

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Concrete Lining	$200	C.Y.	100	$20,000
Concrete Removal	$100	C.Y.	80	$8,000
Excavation	$7	C.Y.	3,000	$21,000
Struct BackFill	$15	C.Y.	1,200	$18,000
Struct. Conc.(8x8 RCB)	$400	C.Y.	1,100	$440,000
BRIDGE REPLACEMENT				
Clear Span Bridge	$80	S.F.	0	0
Bridge Removal	$10,000	L.S.	0	0
Utility Relocation	$10,000	Each	4	$40,000
Outfall Modification	$4,000	Each	4	$16,000
Traffic Control	$50,000	L.S.	1	$50,000
Water Control	$20,000	C.Y.	1	$20,000
ROADWAY REPLACEMENT				
AC Pavement	$5	S.F.	5,000	$25,000
Curb And Gutter	$15	L.F.	100	$1,500
Sidewalk	$6	S.F.	100	$600
Planting Strip	$2	S.F.	100	$200
* Site Health & Safety Plan	$40,000	L.S.	1	$40,000
	SUBTOTAL			$700,300
MOBILIZATION (8%)				$56,024
CONSTRUCTION CONTINGENCIES (10%)				$70,030
SOIL & GROUNDWATER CONTINGENCY				$171,000
CONSTRUCTION COSTS				$997,354
ENGINEERING, DESIGN, ADMIN.INSP (18%)				$179,524
RIGHT OF WAY (Creek Ch)	$100	Acre	3.5	$350
TOTAL COSTS				$1,176,878

03-01-88
FINAL

MATADERO CREEK
REACH 11: Hillview Ave to Foothill Expwy

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
RAMP/CHANNEL MODIFICATIONS				
Gabion Lining	$140	C.Y.	4,600	$644,000
Concrete Removal	$100	C.Y.	0	0
Excavation	$7	C.Y.	500	$3,500
Fill	$10	C.Y.	0	0
Struct. Conc. (Floodwalls)	$400	C.Y.	0	0
BRIDGE REPLACEMENT				
Clear Span Bridge	$80	S.F.	0	0
Bridge Removal	$10,000	L.S.	0	0
Utility Relocation	$10,000	Each	2	$20,000
Outfall Modification	$4,000	Each	2	$8,000
Traffic Control	$25,000	L.S.	1	$25,000
Chain Link Fence	$10	L.F.	2000	$20,000
			0	
ROADWAY REPLACEMENT				
AC Pavement	$5	S.F.	0	0
Curb And Gutter	$15	L.F.	0	0
Sidewalk	$6	S.F.	0	0
Planting Strip	$2	S.F.	0	0
SUBTOTAL				$720,500
MOBILIZATION (8%)				$57,640
CONSTRUCTION CONTINGENCIES (10%)				$72,050
CONSTRUCTION COSTS				$850,190
RIGHT OF WAY (Creek Ch)	$100	Acre	4.8	$480
ENGINEERING, DESIGN, ADMIN.INSP (18%)				$153,034
TOTAL COSTS				$1,003,224

03-01-88
MAT/BAR-DIV

BARRON CREEK DIVERSION CHANNEL
Matadero Creek to Barron Sediment Basin

COST ESTIMATE SUMMARY

ITEM	UNIT COST	UNIT	QUANTITY	AMOUNT
EARTHWORK:				
Excavation	$7	C.Y.	8328	$58,296
Fill	$7	C.Y.	79	$553
Balanced Cut & Fill	$3	C.Y.	20955	$62,865
RAMP/CHANNEL MODIFICATIONS				
Struct. Conc.	$400	C.Y.	2008	$803,200
Concrete Lining	$200	C.Y.	0	$0
Concrete Removal	$50	C.Y.	17	$850
BIKE PATH REPLACEMENT/DETOUR				
A/C Pavement (city bike path)	$3	S.F.	18450	$55,350
Asphalt Removal (city bike path)	$50	C.Y.	228	$11,400
Gunn H.S. Bike Path Upgrade	$3	S.F.	12000	$36,000
Gunn H.S. Detour Route	$3	S.F.	12000	$36,000
MITIGATION (revegetation)	---	L.S.	----	$75,000
UTILITIES				
Relocate Electroliers	$5,000	EA.	4	$20,000
Relocate Gas & Water Lines	$10,000	EA.	2	$20,000
MISCELLANEOUS				
Intake Structure	---	L.S.	----	$63,000
Emergency Spillway	---	L.S.	----	$122,000
Impact Basin Modifications	---	L.S.	----	$119,000
Shoring	---	L.S.	----	$40,000
Confluence Apron	---	L.S.	----	$12,500
Upper Basin Floodwall	$400	C.Y.	120	$48,000
	SUBTOTAL			$1,584,014
MOBILIZATION (8%)				$126,721
CONSTRUCTION CONTINGENCIES (10%)				$158,401
CONSTRUCTION COSTS				$1,869,137
RIGHT OF WAY	$100	Acre	0.5	$50
ENGINEERING, DESIGN, ADMIN., INSP (18%)				$336,445
TOTAL COSTS				$2,205,581

APPENDIX F

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APPENDIX G

Determination of Water Surface Elevation in Flood Basin for Design of Matadero Creek

Overview

The purpose of this Appendix to the Matadero Creek Engineer's Report is to provide documentation of the methodology used to determine the water surface elevation of the Palo Alto Flood Basin for the design of upstream work on Matadero Creek. It is important to recognize that there is a difference between the water surface elevation used to design the flood basin and that used to design the upstream creek work. The explanation of these differences and supporting reasoning is contained herein.

Water Surface for Design of Flood Basin

Documentation for the methods used to determine the water surface elevation used in the design of the flood basin is provided by Reference 13. The Flood Basin is designed to safely contain the maximum water surface elevation that would occur in the event of a 1% flood on the tributary creeks. The maximum water surface reached is dependent upon the relative timing of the inflow flood hydrograph and the tidal cycle. In general, the maximum water surface in the basin would occur about six hours after the flood peaks of the tributary creeks. The design water surface in this case is elevation 5.7 feet National Geodetic Vertical Datum (NGVD).

Water Surface for Design of Matadero Creek

Because the maximum basin water surface elevation occurs about six hours after the flood peaks on the tributary creeks, it follows that the basin is always in the filling (rising) process when the peak of the inflow flood hydrograph occurs. Figure G-1 illustrates this principle graphically. This situation is not simply a coincidence but rather a direct result of the physical relationship between the rate of inflow, volume of inflow, and basin water surface. In order to determine the appropriate flood basin water surface elevation for the design of Matadero Creek, a 75-hour tide cycle was used in conjunction

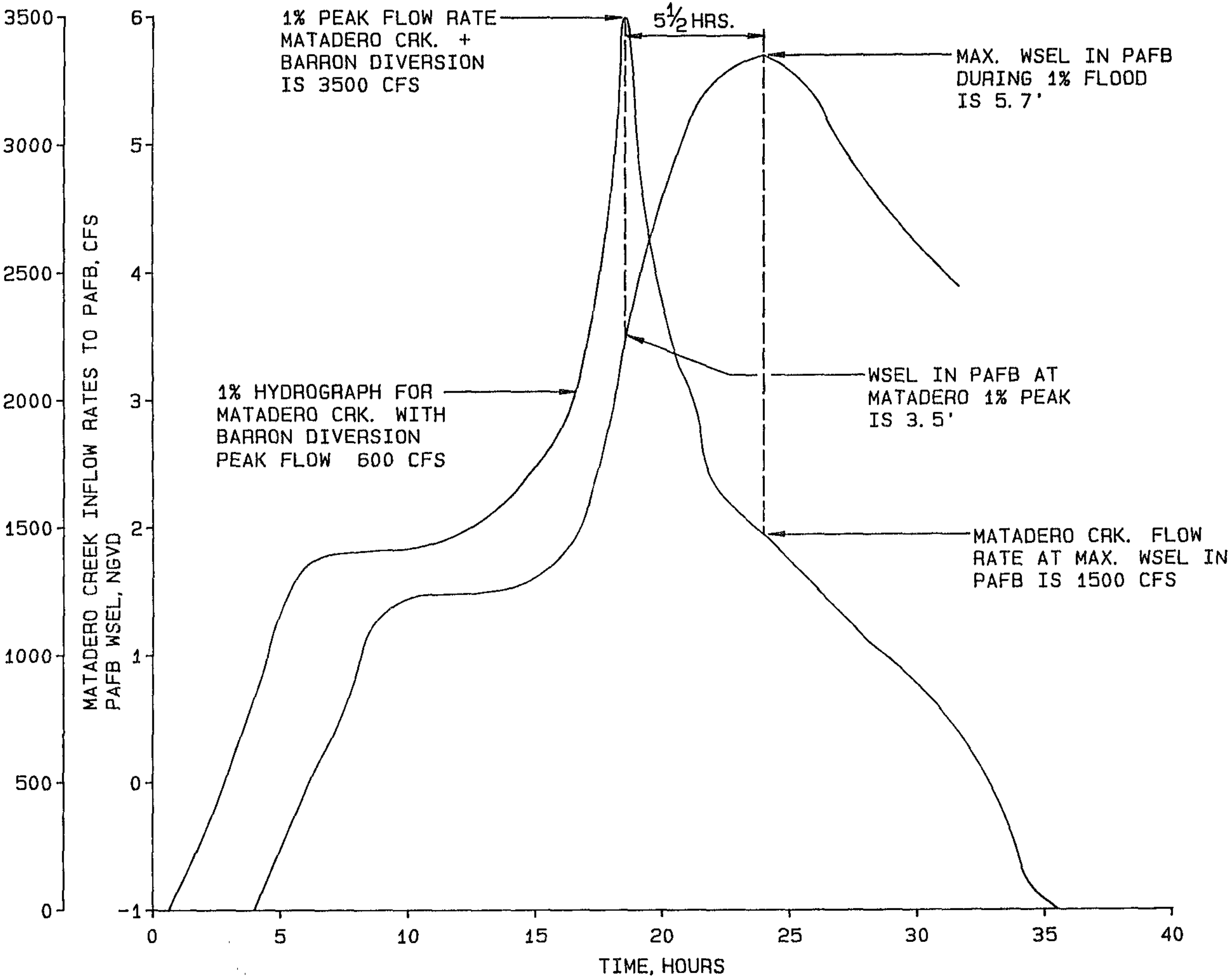
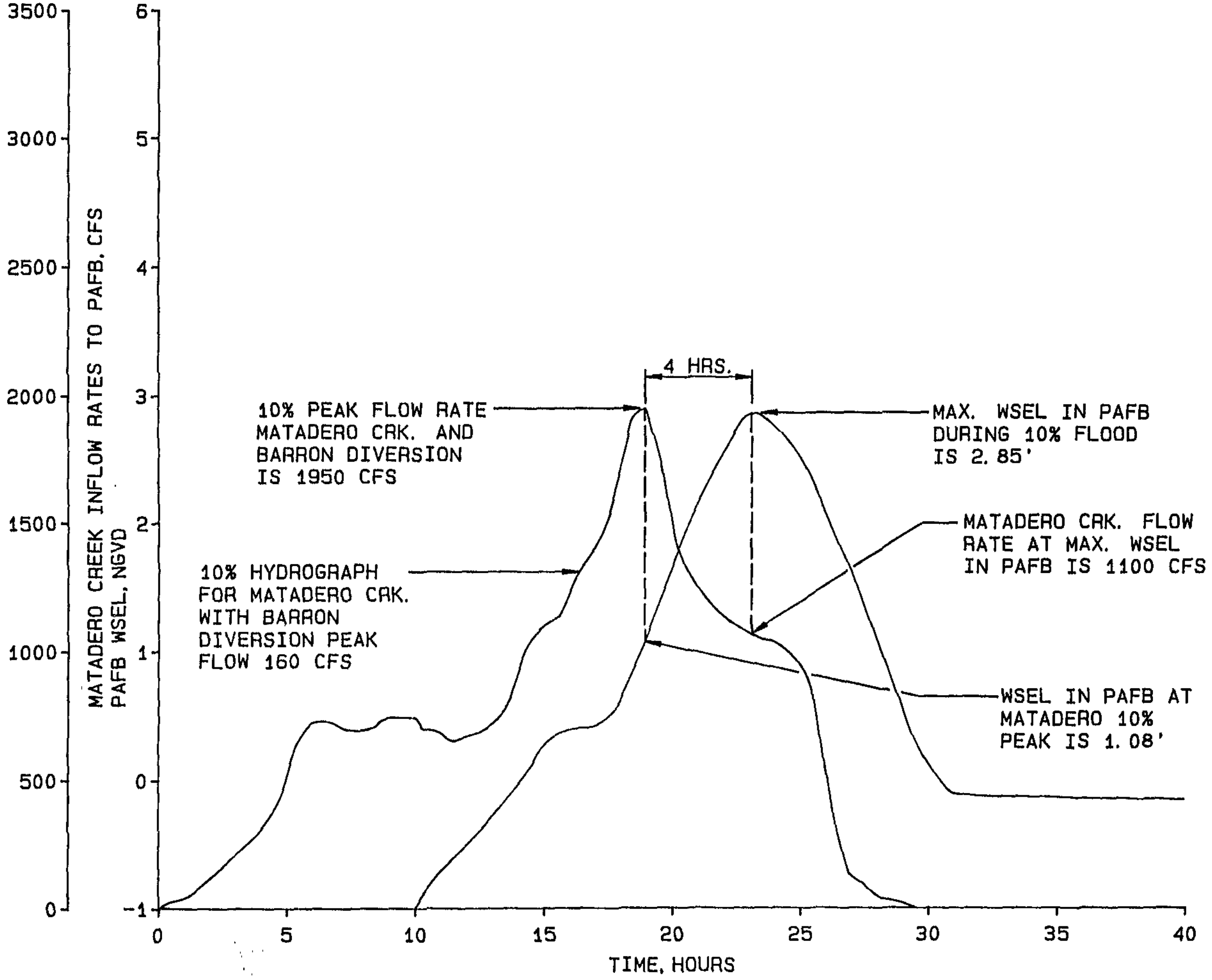


FIGURE G-1: PAFB AND MATADERO CREEK 1% HYDROGRAPHS



10% PEAK FLOW RATE MATADERO CRK. AND BARRON DIVERSION IS 1950 CFS

MAX. WSEL IN PAFB DURING 10% FLOOD IS 2.85'

MATADERO CRK. FLOW RATE AT MAX. WSEL IN PAFB IS 1100 CFS

10% HYDROGRAPH FOR MATADERO CRK. WITH BARRON DIVERSION PEAK FLOW 160 CFS

WSEL IN PAFB AT MATADERO 10% PEAK IS 1.08'

FIGURE G-2: PAFB AND MATADERO CREEK 10% HYDROGRAPHS with the 1% flood hydrograph. The basin water surface elevation at the time of the peak inflow was found to vary from a low of 2.79 feet NGVD to a high of 4.73 feet NGVD. The variation in these values is caused by the relative timing of the tidal cycle and the flood hydrograph. The maximum value of 4.73 was obtained when the peak of the tidal cycle (4.6 feet NGVD, MHHW) occurred about three hours prior to the peak of the flood hydrograph (3,500 cfs from Matadero Creek).

To avoid compounding probabilities of flood and tidal events the average of 75 different basin elevations was used. The basin elevations were obtained by varying the relative timing of the tidal cycle and flood hydrograph on an hourly basis as described in Reference 13. The resulting average water surface elevation obtained is 3.94 feet NGVD (see Table G-1).

The first condition analyzed in the design of Matadero Creek is based upon the 1% peak flow of 3,500 cfs occurring when the Flood Basin water surface elevation is 3.94 feet NGVD. A water surface profile was computed for Matadero Creek under these conditions.

A second condition was evaluated to determine if it might yield a higher water surface elevation on Matadero Creek. When the maximum Flood Basin water surface elevation of 5.7 feet NGVD occurs, Matadero Creek will have already peaked about six hours prior and would be in the recession (decreasing) part of the hydrograph. This situation is also illustrated in Figure G-1. The flow rates at this time would be about 1,370 cfs on Matadero Creek. A hydraulic analysis of Matadero Creek was performed for this situation and it was found to yield a higher water surface elevation on Matadero Creek up to about Greer Road.

Therefore, the design of Matadero Creek from the Flood Basin to Greer Road is based upon the second condition. This condition indicates that the backwater effects of the Flood Basin influence behavior on Matadero Creek more strongly than does the peak 1% design flow. However, the influence only carries upstream to Greer Road. Above Greer Road, the peak 1% design flow controls the resulting water surface elevation.

TABLE G-1

MATADERO CREEK
TIDE CYCLE SUMMARY

Tide Cycle Hydrograph Timing (Hours)	Max. WSEL in the Basin (feet)	WSEL in Basin at Matadero Peak (feet)
0	5.69	3.44
1	5.62	3.66
2	5.57	4.00
3	5.52	4.36
4	5.43	4.62
5	5.30	4.73
6	5.22	4.72
7	5.25	4.59
8	5.26	4.40
9	5.23	4.24
10	5.20	4.15
11	5.15	4.14
12	5.07	4.15
13	4.98	4.26
14	4.84	4.31
15	4.68	4.29
16	4.51	4.21
17	4.47	4.04
18	4.62	3.84
19	4.78	3.64
20	4.95	3.43
21	5.09	3.23
22	5.22	3.39
23	5.28	3.06
24	5.37	3.22
25	5.40	3.49
26	5.42	3.84
27	5.42	4.18
28	5.37	4.47
29	5.31	4.64
30	5.18	4.69
31	5.15	4.62
32	5.18	4.46
33	5.19	4.29
34	5.17	4.16
35	5.13	4.05
36	5.08	4.05
37	4.99	4.14
38	4.87	4.21
39	4.70	4.24
40	4.52	4.19
41	4.37	4.07
42	4.22	3.89
43	4.35	3.70
44	4.49	3.51
45	4.66	3.31
46	4.83	3.13
47	4.95	2.93
48	5.03	2.79
49	5.09	2.80
50	5.16	3.02
51	5.20	3.44
52	5.19	3.80
53	5.19	4.11
54	5.14	4.35
55	5.05	4.46
56	4.91	4.45
57	4.97	4.36
58	5.05	4.22
59	5.11	4.08
60	5.11	3.97
61	5.11	3.93
62	5.07	3.94
63	5.00	4.03
64	4.93	4.16
65	4.82	4.28
66	4.69	4.31
67	4.73	4.22
68	4.82	4.04
69	4.94	3.87
70	5.08	3.68
71	5.21	3.46
72	5.35	3.28
73	5.48	3.19
74	5.55	3.17
75	5.69	3.44
Averages	5.06	3.94
Maximum	5.69	4.73
Minimum	4.22	2.79

APPENDIX H

Effects of Land Surface Subsidence on Flood Control and Drainage

Overview

Land surface subsidence has occurred in the Santa Clara Valley as a result of overdraft pumping of the groundwater basin. It is estimated that subsidence began about 1920 and continued through about 1969. In this Appendix, information is provided to explain how land subsidence affects drainage and flood control.

Stream Channel Geomorphology

Early maps prepared for Santa Clara County (Figure 3, reference 22) indicate that many streams lost definition as they reached the mild Valley floor. Adobe and Matadero Creeks are excellent examples of this condition. Both creeks appeared simply to end near the Southern Pacific Railroad tracks in present day Palo Alto.

This phenomenon can be understood with principles of stream channel hydraulics and geomorphology. In the steeper portions of the upper watershed, flow velocities are generally high and tend to cause erosion. The high velocity flow carries sediment in suspension and as bedload. As the gradient of the stream flattens out, the flow velocities decrease, first depositing the coarser bedload material and then the finer suspended sediment.

Over geologic time these processes have created the alluvial deposits that comprise the Santa Clara Valley floor and groundwater basin. As the stream channels changed course, the various layers of gravels, sands and clays were deposited. The process was further complicated by changes in long-term weather patterns and fluctuations in the level of San Francisco Bay.

At the point where the channels lost definition, the streams flowed overland as shallow sheet flow. This region of sheet flow established a natural floodplain that eventually reached the flat marshlands and flowed into San Francisco Bay. The floodplains overlapped by combining with those of adjacent creeks and the tidal fringe. This natural floodplain is what many of the creeks attempt to reestablish.

Land Surface Subsidence

As the Santa Clara Valley developed into an agricultural economy, the demand for irrigation water increased. By 1915, more water was being pumped out of the groundwater basin than could be replenished by nature. The result was groundwater overdraft, consolidation of the clay layers and land subsidence. The overdraft pumping continued and in 1929 saltwater intrusion along the Bayfront was first discovered.

During the 1950s many industries moved into Santa Clara County. Between 1950 and 1960, the County's population increased over 120% to 642,000. The urbanization of the Valley created additional problems for water resources management.

An average of about two feet of land surface subsidence had occurred in the project study area between 1920 and 1950. Other areas, such as downtown San Jose, had experienced even greater amounts.

Figure H-1 is a time history of land subsidence at three bench marks located in Palo Alto. Note that the highest rate of subsidence occurred around 1960 but was essentially halted by 1970 after water importation had begun.

Results of Land Subsidence

Land subsidence may have a profound effect upon local drainage and flood control. In general, the gradient of stream channels will be steepened upstream of the sag point. Downstream of the sag point, the gradients will be flattened and, in some cases, an adverse slope may result. Sediment will accumulate in the sag point and establish a new channel gradient that is much flatter than originally existed. This sequence of events is depicted in Figure H-2.

The upstream channel will have higher flow velocities and an increased carrying capacity because of the steeper channel slope. Conversely, the downstream channel will have decreased flow velocities and carrying capacity because of a flattened channel slope. Since the range of tidal elevations in the San Francisco Bay remains essentially constant, the downstream channel capacity is decreased even further because of a greater backwater effect from the Bay.

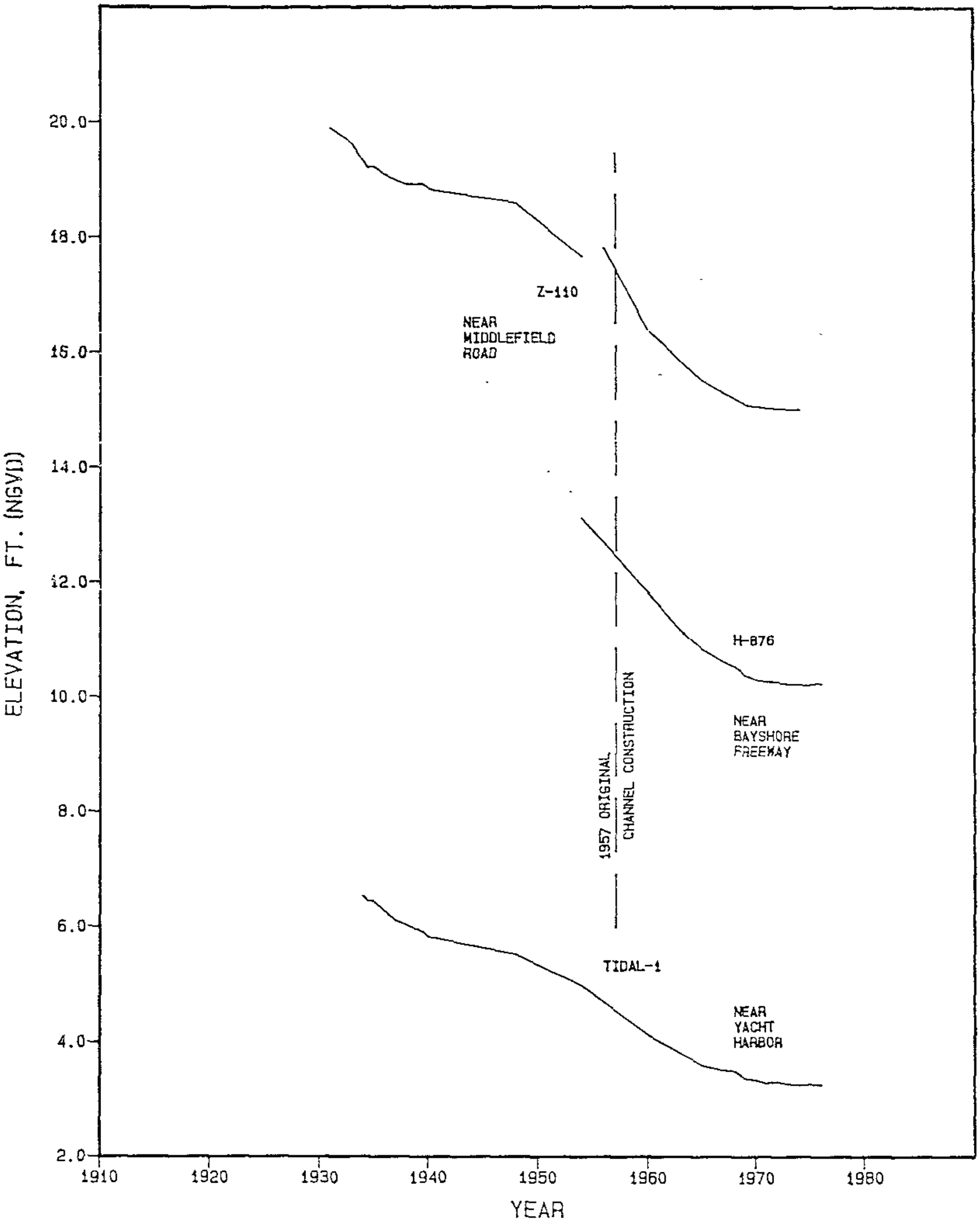
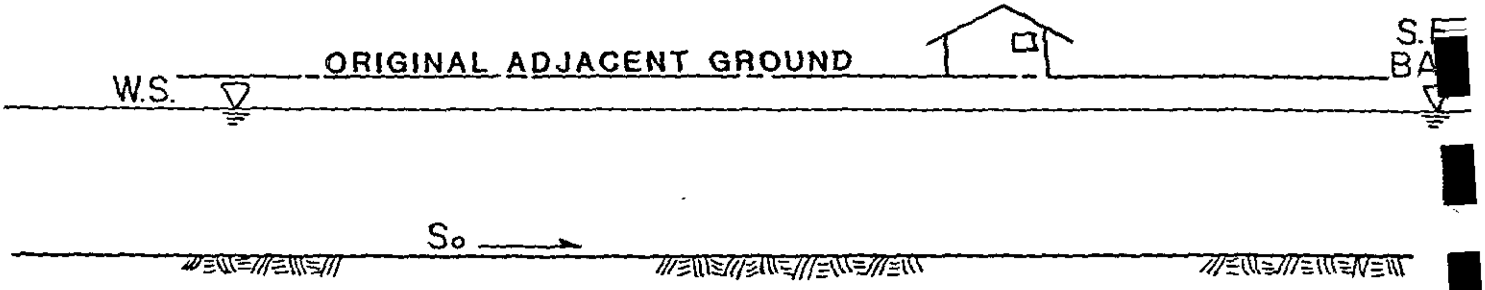
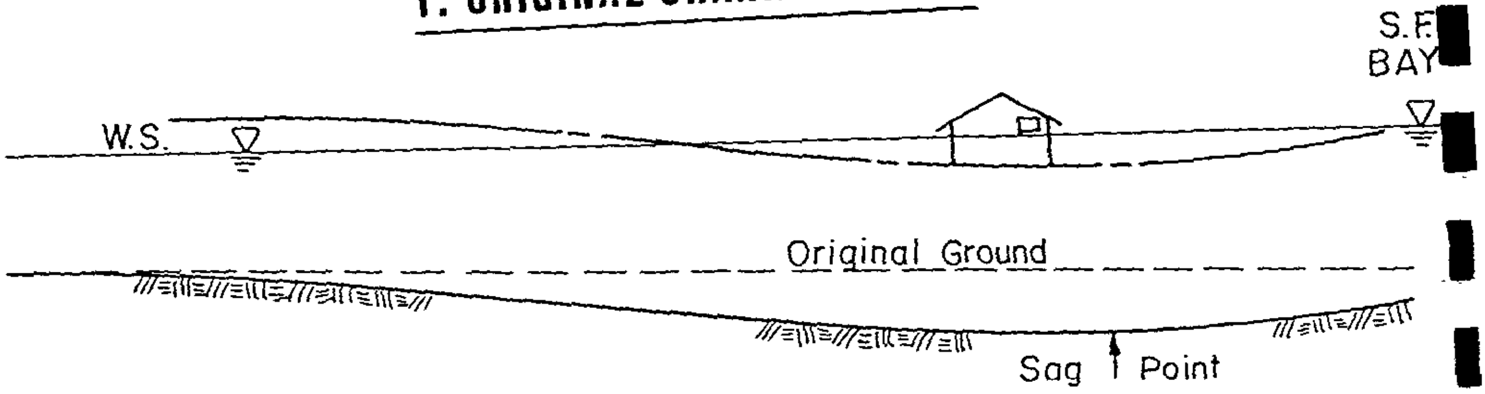


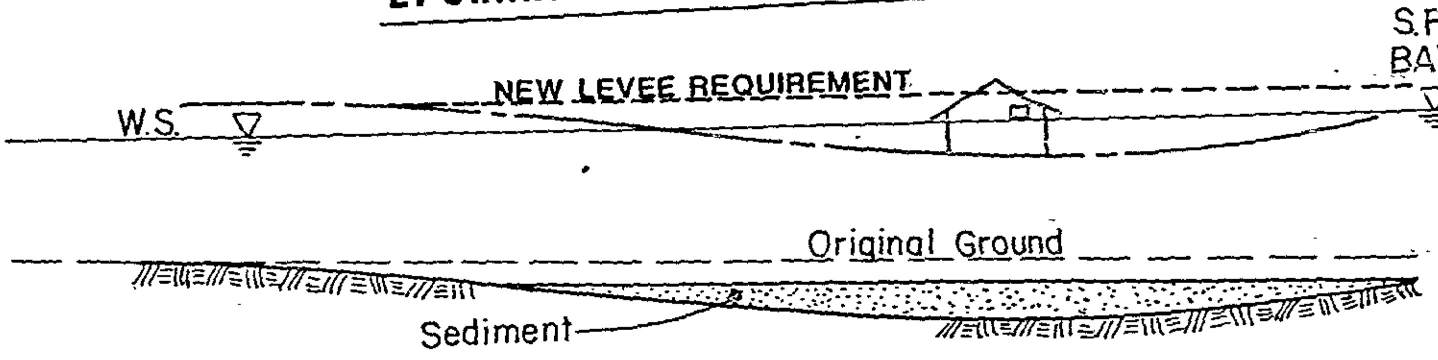
FIGURE H-1
LAND SURFACE SUBSIDENCE AT VARIOUS
BENCHMARKS NEAR ADOBE & BARRON CREEKS



1. ORIGINAL CHANNEL SLOPE



2. CHANNEL SLOPE WITH SUBSIDENCE



3. CHANNEL SLOPE WITH SUBSIDENCE AND SEDIMENT DEPOSITION

FIGURE H-2
EFFECTS OF LAND SUBSIDENC
ON STREAM CHANNELS

Both local drainage and flood problems can be worsened by land subsidence. In the downstream Baylands area, the streams attempt to re-establish the natural floodplain. The floodwaters must be contained by levees and directed out to the Bay to avoid flood damage. But, as the land has dropped in elevation, the Bay remains constant and water surface elevations in the stream may now rise above adjacent ground. As a result, the local drainage systems must employ pumping stations in order to force local runoff into the major flood control channels and creeks.

APPENDIX I

National Flood Insurance Program

Floods are the most serious natural hazard facing the American people. Ninety percent of the natural disasters in this country are flood-related. Since 1936, over $11 billion in federal appropriations have been spent to build flood control works to prevent or reduce flood losses. Despite that investment, flood losses continue to increase. The U. S. Water Resources Council estimates that urban flood losses exceed $1.5 billion each year.

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to mitigate the effect on communities and individuals of property damage due to floods and flood-related hazards. The NFIP enabled property owners to purchase flood insurance at a reasonable rate. Such insurance is designed to reduce the escalating costs of property damage caused by floods and is generally unavailable from private sector insurance companies. The program is based on an agreement between local communities and the federal government that, if a community will implement programs to reduce future flood risks, the federal government will make flood insurance available within the community as a financial protection against flood losses which do occur.

The NFIP has two objectives - to make flood insurance available for existing structures in flood-prone areas and to require that local governments regulate location and construction of new buildings to minimize future flood losses. Extensive public subsidies are required to make flood insurance affordable for owners of existing structures. This cost is offset by reduction in future disaster relief appropriations which would result from requiring new construction to be less susceptible to flood damage. Community participation in NFIP and individual purchase of insurance were both voluntary based on the 1968 act. The Flood Disaster Protection Act of 1973 made flood insurance mandatory when "federally related financing" was involved in acquiring or developing property located in a defined flood hazard area. Federally related financing includes direct federal grants and loans and mortgage loans by financial institutions insured or regulated by federal agencies such as the Federal Reserve Bank and the Federal Deposit Insurance Corporation. Before property owners can obtain flood insurance, the local community (city or county) must join the program. Joining in the NFIP requires that those communities with designated flood hazard areas adopt and enforce floodplain management measures that will diminish the impact of future floods.

Once a community has joined the program, property owners throughout the community can purchase subsidized insurance to cover structural losses up to $35,000 for a single-family dwelling, $100,000 for a multi-unit dwelling, and $100,000 for non-residential structures. The annual rate for residential dwellings is $0.55 per $100 of value and for other structures, $0.65 per $100 of value. The minimum homeowner's cost is $192.50 ($0.55 x 350). Also, content losses up to $10,000 for residential units and $100,000 for non-residential units can be covered at annual rates of $0.65 and $1.30 per $100 of value, respectively. Following the development of flood data needed to fully define floodplain management measures and their adoption and enforcement by the local community, an additional $150,000 of nonsubsidized insurance (at actuarial rates) will be made available for residential dwellings. The actuarial rates vary based on the degree of risk.

APPENDIX J

Basis of Design of the Barron Diversion Channel

Design Concept

The concept of the Barron Diversion channel is to economically optimize the design of proposed flood control improvements. This approach to solving the flood problem will also minimize overall disruption to the community. The Barron Diversion must not allow more than 600 cfs to enter Matadero bypass and therefore will not induce flooding in the downstream channel. Because of the complex hydraulic performance required for the diversion, a physical hydraulic model study will be done.

Design Constraints

The existing Barron Creek channel system downstream of the sediment basin has capacity to safely carry about 180 cfs without flooding. Design considerations for the Barron Diversion channel include: 1) allowing only 160 cfs to flow into Barron Creek from the basin during the 1% flood, 2) designing the Barron Diversion to carry 600 cfs and Matadero Creek measures to safely carry the additional 600 cfs of diverted flow during the 1% flood, and 3) allowing no more than about 600 cfs to enter the Barron Diversion, even during more extreme floods than the 1% event.

Modifications will be made to the basin outlet pipe to limit the outflow to 160 cfs under the design basin pool level. The intake structure of the Barron Diversion will be designed to allow 600 cfs to enter under design pool level. Because the Diversion intake has been designed to develop a critical depth control at the intake a single stage-discharge rating exists up to about the design pool level. Above the design pool, the inflows will be restricted. The restriction of inflow will be achieved by using a removable steel plate bolted to the face of the intake. Both the steel plate and the trash rack must be removable to provide maintenance access.

Under extreme events, the flow in the diversion culvert will also be restricted to 600 cfs by providing an "efficient" overflow spillway for the Barron sediment basin to flow into Barron Creek. The existing overflow spillway serves the same purpose, however, it is not efficient enough and would require an unacceptable increase in pool level to discharge a moderate increase in flow above the 1% level. The corresponding increase in basin pool level would cause an increased flow into Barron Diversion above the 600 cfs design level, which is not acceptable. The new overflow spillway must be very efficient under extremely low head so that nearly all incoming flow above the one-percent design flow rate of 760 cfs will be discharged into Barron Creek and not the Barron Diversion Channel.

Operational Overview

Low flows will not be affected by the proposed modifications of the Barron sediment basin. As the basin inflow increases low flows will first exit through the existing outlet pipe into Barron Creek. Refer to Figure J-1 on the following page for the discharge rating curve.

When an inflow rate of about 140 cfs is reached the basin will be filling because the inflow rate will be approaching the 160 cfs maximum capacity of the outlet pipe. The basin pool level will rise to elevation 83.7 feet and cause flow to begin to enter the Barron Diversion channel. There will be no flow exiting the overflow spillway.

With a basin inflow rate of about 320 cfs (10% design flow rate) approximately 150 cfs will exit via the Barron Creek outlet pipe and 170 cfs will exit the basin through the Barron Diversion channel. There will be no flow exiting the overflow spillway.

Under the design 1% flow rate of 760 cfs the Barron Diversion intake will begin being restricted by a sluice gate and will convey 600 cfs while 160 cfs will flow down the existing Barron Creek system via the outlet pipe. There will be incipient flow exiting the overflow spillway.

If a flood event greater than the 1% (760 cfs) were to occur the basin pool will rise slightly above the design level of 89.0 feet. The overflow spillway crest of the basin will be exceeded and nearly all the additional inflow to the basin will be conveyed to

BARSED/RC3

PROPOSED RATING CURVE
FOR
BARRON CREEK AT SEDIMENT BASIN

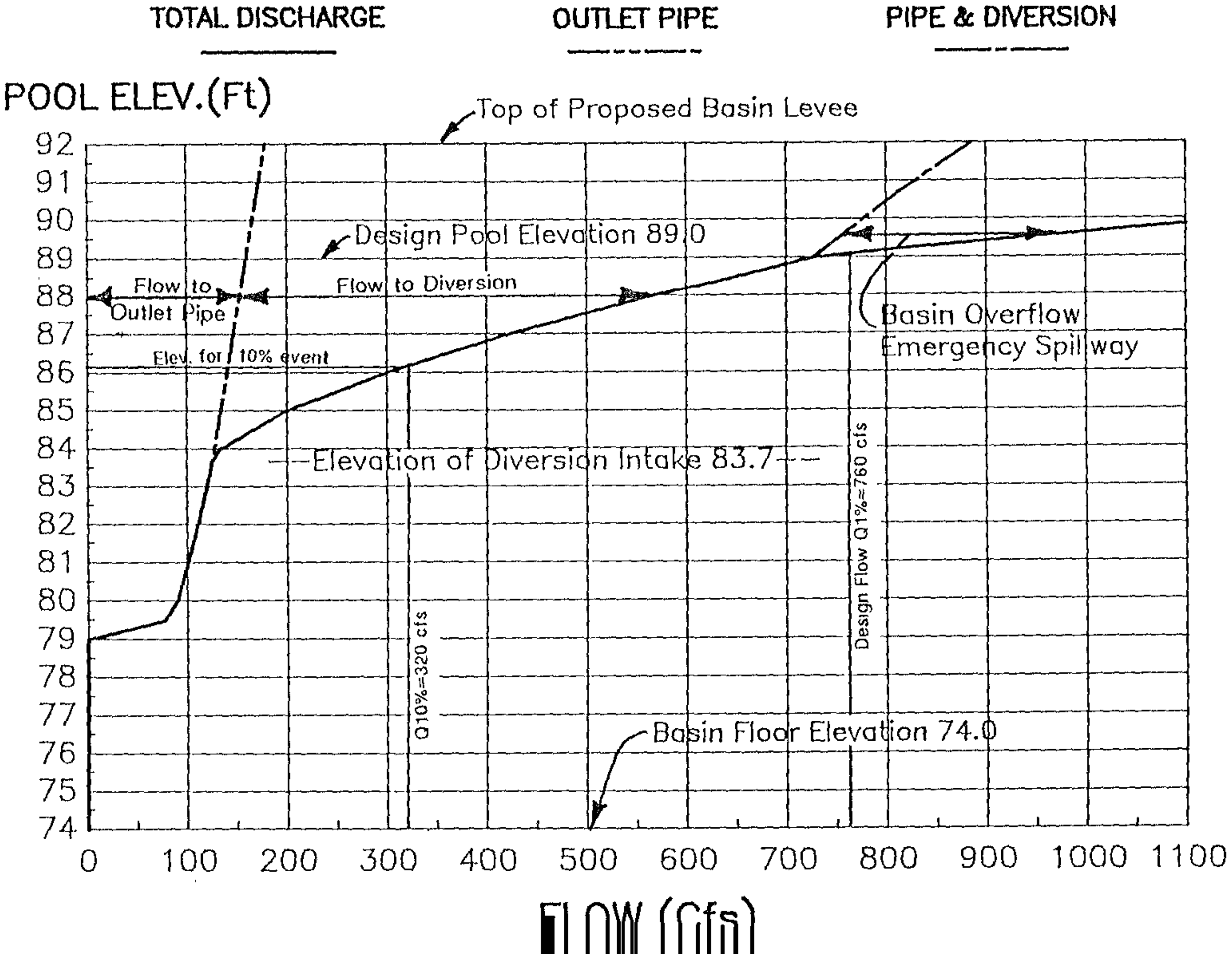


FIGURE J-1

Barron Creek. The inflow to the Barron Diversion channel will be increased slightly because of the increased basin pool level. The bolt-on plate at the diversion intake will restrict inflows. An increased pool level of about one foot will cause approximately 400 cfs to pass the overflow crest and less than 50 cfs additional to enter the Barron Diversion.

Flows that exit via the overflow crest will be conveyed to a stilling basin and then to the existing 60-inch diameter pipe and swale that crosses Gunn High School.

Model Study Guidelines and Objectives

The objectives of the hydraulic model study are:

1. To verify performance of the modified basin outlet pipe during flows less than 160 cfs.
2. To verify performance, during intermediate flows (400 cfs), of the basin outlet pipe and the proposed Barron Diversion Intake Structure.
3. To verify performance, during 1% design flow (760) cfs) conditions, of the basin outlet pipe and the proposed Barron Diversion Intake Structure.
4. Finally, to verify that under events exceeding the 1% design flow rate the modified overflow spillway and bolt-on plate at the diversion intake will cause nearly all the additional inflow to be conveyed into the downstream Barron Creek system.

APPENDIX K

Bike Path Detour During Construction

Portions of the proposed Matadero Bypass and all of the proposed Barron Diversion will affect the City of Palo Alto's existing bike path during the construction process. To provide uninterrupted service to both pedestrian and bicycle traffic, a tentative detour plan has been developed in cooperation with Gunn High School and the City of Palo Alto. The actual detour route may change as finer details are worked out during the design phase.

Bike Path Detour Alignment

The tentative detour route will make use of existing transportation routes where possible. The southerly limit of the detour will begin just south of the District's Barron Creek Sediment Basin and generally follow the alignment of the existing swale across the Gunn High School field. As shown in Figure K-1, the proposed detour will then meet an existing path that follows the northerly property line of Gunn High School. This existing path does not meet present design standards and will be upgraded as part of the project.

The bike path will then connect with McGregor Way via an existing gate and path. As indicated in Figure K-1, the detour route will then follow Ilima Way north to Laguna Avenue. Between Matadero Avenue and Varian, the detour would have to be constructed within the existing 80-foot wide right of way for the remaining 500 feet. A temporary path would be built along the westerly side of the right of way and would require removal of most existing vegetation. The temporary path would be separated by a safety fence from the construction zone and measures would be taken to provide privacy to the two adjacent residences. Upon completion of the underground culvert, the 500 feet of temporary path would be removed and the area revegetated and the original bike path alignment would be reestablished.

Construction Staging

Because of the various constraints of the project, it is possible that only a portion of the proposed detour route will be used at a given point in time. For example, if the Matadero Bypass were constructed one summer and the Barron Diversion the following summer, only half the detour route would be in use at one time. However, the current construction schedule (Table 10) calls for the bypass and the diversion to be built in the same year.

3/14 - RRT w/a
SNW

Memorandum - **HENRY M. GUNN SENIOR HIGH SCHOOL**

March 9, 1986

2036 '88 MAR 14 P1:42

Randall R. Talley
Division Engineer
Predesign Division
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

Dear Mr. Talley:

We have reviewed the plans for the **Matadero and Barron Creeks** project (Appendix K) and we would like to propose an alternate route for the detour of the Bol Park Annex bike path. When we walked the site and discussed the possibility of crossing the center of the campus, we agreed that the most expedient access would be to up-grade the paved path along the northerly property line, and then pave across the campus, linking with the existing southerly section of the bike path.

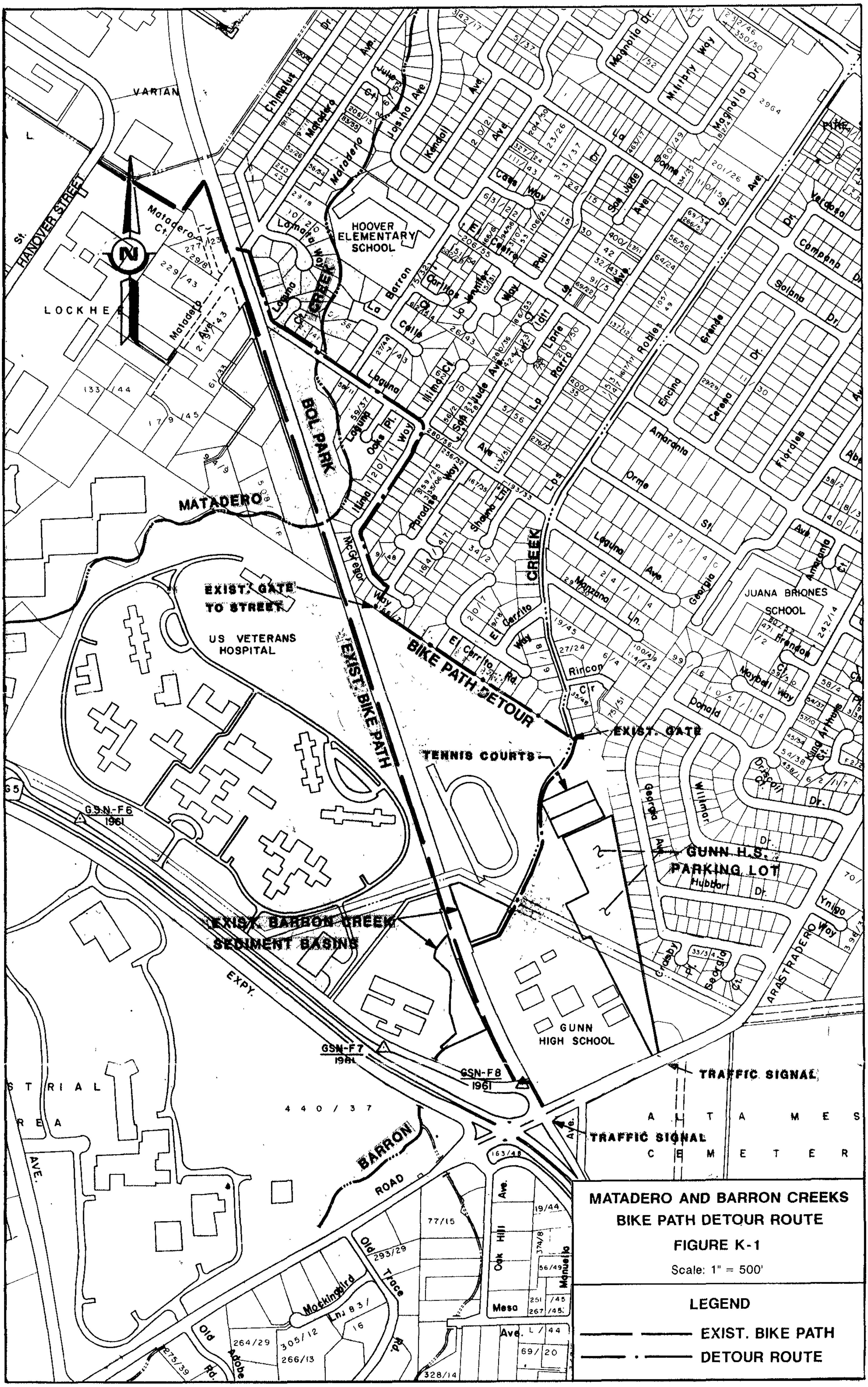
Since our discussion and agreement, we feel that it might be in the schools' best interest to suggest a modification to the proposed plan. We believe that paving through the campus, and upon the completion of the project having to remove the temporary bike path, grade and reseed to its original state, could prove to be disruptive and unnecessarily expensive. We believe that upgrading the paved path along the northerly property line and using the existing driveway and path onto Arastradero at the entrance to Gunn Senior High School with some minor modifications would be a more cost effective and less disruptive proposal.

We are aware that our modification might not be acceptable by the City, however we believe the timing of the project, the monitoring of the use of the bike path, and time of the opening and closing of the school day could allow this proposal to be reviewed again. We are seeking a proposal that is safe, less expensive and the less disruptive to the school and its' programs.

Respectfully,

Dan E. Sarouhian
Assistant Principal - Administration

enclosure
cc. A. Lavagnino



MATADERO AND BARRON CREEKS
BIKE PATH DETOUR ROUTE
FIGURE K-1
Scale: 1" = 500'

LEGEND

▬ ▬ ▬	EXIST. BIKE PATH
▬ · ▬	DETOUR ROUTE

APPENDIX L

Groundwater and Soils Contamination Issues

Issues

The primary issue related to groundwater and soils is the potential effect of construction on areas of known groundwater contamination. A second issue of potential concern is the possibility of encountering toxic substances in excavated soil in or adjacent to the Stanford Industrial Park. Both of these concerns are addressed in the following paragraphs.

Site Locations

There are three locations within the project study area where groundwater contamination or toxics in soil may likely be encountered. The first is along the Stanford Channel right of way adjacent to Varian Associates, in Reach 7B, where the Matadero Bypass is proposed. The second is the Watkins-Johnson site, in Reach 10, where a parallel eight-foot by eight-foot culvert is proposed. The third is near the Barron sediment basin adjacent to the Fairchild facility where the Barron Diversion channel is proposed. All three sites have groundwater contamination from TCE and TCA as well as other compounds.

Groundwater Data

1. Varian Site

Soil borings taken (28) in October 24 and 31 of 1986 at the Varian site show the groundwater levels at test wells V1-1 (near El Camino Real) and V6-1 (near Building 6 and the bike path) to be elevation 18.6 feet and 27.0 feet respectively. These levels are below the bottom elevation of the proposed bypass channel culvert. Therefore, it is unlikely that groundwater will be intercepted along Reach 7B of the proposed bypass channel.

2. Watkins-Johnson Site

Near Hillview Avenue recent groundwater monitoring (27) indicates that the depth to groundwater varies from 11 to 21 feet. In the December 1986 report by CH2M Hill it was stated that "frequent monitoring of creek water levels and shallow groundwater levels near the creek should be conducted (as part of the groundwater contamination study). This monitoring may be important since the chemical and hydraulic data indicate that contaminated groundwater is flowing into Matadero Creek." Because it appears likely that groundwater will be intercepted if excavation is done for the proposed parallel culvert at Watkins-Johnson and concentrations of TCE, TCA, and other compounds have been found to be as much as 9,000 parts per billion (ppb) in the groundwater, special measures may be required. Creek water samples yielded concentrations of 8 to 18 ppb of TCE. As further studies are done at the site, appropriate measures or plans will be developed to minimize construction related impacts. Concerns are addressed in the next section.

3. Fairchild Site

At the Fairchild facility near the Barron Creek sediment basin and the proposed Barron Diversion Channel, the groundwater levels are generally below the proposed depth of excavation. Shallow groundwater may be contributing flow into the sediment basin, however, but should not affect excavation for the diversion channel.

Responsible Agencies

Several different agencies have jurisdiction over or are involved in the groundwater contamination investigations. The California Regional Water Quality Control Board (RWQCB) has jurisdiction over most groundwater contamination problems and is coordinating the studies at the Varian and Fairchild sites. The RWQCB issues permits for pollutant discharge under the NPDES program of the Clean Water Act and will be contacted during the design of the project.

The California Department of Health Services (DOHS) Toxic Substance Control Division also has jurisdiction in many contamination cases and is coordinating the Hillview-Porter (Watkins-Johnson) site investigation. The DOHS administers programs for worker safety involving hazardous wastes that have been set up by both the National and State Occupational Safety and Health Administration (OSHA). Attached to this appendix are the DOHS Health and Safety Plan guidelines that will be implemented as part of this project.

The Environmental Protection Agency (EPA) is a federal agency responsible for administration of various laws dealing with hazardous wastes such as the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund Act) and the Superfund Amendments and Reauthorization Act (SARA). Worker safety guidelines established by SARA are very similar to those defined by the State DOHS Health and Safety Plan and are contained in 29 CFR Part 1910. Title III, Section 313 of SARA concerns toxic chemical release reporting requirements. It appears that companies manufacturing, processing or using chemicals would be subject to Section 313 but the District would not be since it is not a manufacturer or processor of chemicals. A final determination will be made by EPA if RCRA applies to the project prior to design and construction of the upper reaches.

Management Plan

A plan has been briefly outlined to address the concerns raised by the presence of known contaminated groundwater within the project area. The approach of the plan includes:

1. Preconstruction groundwater and soil sampling through Reaches 7B, 8B, 9B, 10 and the Barron Diversion.

2. Monitoring and protection measures that may be needed for the workers and the adjacent community during construction.

3. A contingency plan on how to deal with toxic substances not identified or located during preconstruction testing but encountered during construction.

Of the three sites (Varian, Fairchild, Watkins-Johnson), the Watkins-Johnson (W-J) site appears to be of the greatest concern because it is the only site where groundwater is likely to be intercepted and it has recorded the highest concentration levels of groundwater contamination.

Construction at the W-J site is scheduled to occur in the 1992/1993 construction season (see Table 10). During the next four years sufficient data will be collected as part of the investigation by the State DOHS to characterize the site's groundwater hydraulics, geologic formation and contamination plume. Within this four-year time frame it is also likely that groundwater cleanup activities will have started.

The three-stage management plan has been developed to minimize the effects of construction on the existing contamination and to assure compliance with all state and federal laws. A detailed health and safety plan will be developed during final engineering design. The Health and Safety Plan will be prepared in cooperation with the State DOHS and EPA. Following are other objectives of the design and construction:

1. Utilization of groundwater and contamination information developed by others in conjunction with groundwater cleanup efforts.

2. Establishment of an air quality monitoring program during construction to determine what measures, if any, will be needed to protect construction workers and the adjacent community.

3. Minimize aggravation of the existing groundwater contamination problem by working cooperatively with efforts that may be in effect to clean up the groundwater.

4. Exercise special care in specifying acceptable methods of water control during construction.

5. Design the proposed facility in such a manner that community exposure to toxics is not significantly worsened.

6. Take soil boring samples prior to construction at 300-foot intervals along the alignment of the proposed bypass, diversion and Watkins-Johnson culvert construction to check for possible toxics. These may be supplemented with exploratory trenches.

The possibility of encountering contaminated soil is of greater concern, but is unlikely based on presently available information. To provide for a clear progression of contingency planning related to this issue the District proposes the following steps:

1. Soil boring sampling program at least one year prior to construction within the Stanford Industrial Park. The District will pay this cost.

2. Execution of agreements between the District, Stanford, and Stanford Lessees regarding responsibility for bearing the costs of possible disposal of contaminated soil at least six months prior to construction. The District will not pay disposal costs.

3. Preparation of a plan outlining procedures to be taken in the event contaminated soil is discovered. This will consist of classifying the waste according to state standards, identifying appropriate disposal sites or treatments, and estimating relevant unit costs. This element should be accomplished in parallel with step 2 above.

4. Establishment of a soil monitoring program to be implemented during construction. This element of work could be incorporated into the Site Health and Safety Plan previously discussed.

It is difficult to speculate on the probability of encountering contaminated soil. The District will not undertake construction until the four items of the contingency plan are completed. If contaminated soil is encountered it will be classified and disposed of at an approved site in compliance with all relevant state and federal laws.

2/3 - KWW 4/12
RRT
BG "
JWS
"

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704

January 29, 1988

Keith Whitman
Santa Clara Valley
 Water District
5750 almaden Expressway
San Jose, CA 95118

Dear Keith,

As per your request, I am sending you a copy of the Department's Site Health and Safety Plan Outline and Site Safety Plan Outline and Guidance for Site Assessment for your information and reference. As I indicated over the phone, we use these documents as guidance for our Contractor's or Responsible Parties when conducting investigations on hazardous waste sites or otherwise contaminated properties. Your use of the documents should be predicated on your particular investigation(s). In addition, as we discussed, the 40 CFR Part 1910 of the Federal Register also contains guidance and regulations on various aspects of investigations at hazardous waste sites.

If I can be of further assistance on this matter, please give me a call.

Sincerely,

Clifton W. Davenport

Clifton W. Davenport
Associate Engineering Geologist
Site Mitigation Unit
Toxic Substances Control Div.
North Coast California Section

4100 '88 FEB -3 P1:32

SITE HEALTH AND SAFETY PLAN OUTLINE

1. Identification of key personnel for the project, including:
    - -- specific assignment for the project
    - -- health and safety responsibilities
2. Job hazard analysis for each work assignment at the site
3. Summary of risk assessment for the project, including:
    - -- threat to workers
    - -- threat to nearby community (if applicable)
    - -- threat to environment
4. Air monitoring plan for project, including:
    - -- ambient air quality
    - -- assessment of community exposure (if applicable)
    - -- assessment of worker exposure
5. Personal protective equipment selected for the project
6. Delineation of work zones on-site and decontamination procedures for personnel and equipment
7. Listing of general safe work practices for on-site activities
8. Description of security measures established for the site
9. Emergency response plans established for the project, including:
    - -- on-site emergencies
    - -- off-site emergencies
    - -- nearby community protection (if applicable)
10. Worker training requirements for the project
11. Medical surveillance program for field staff, including:
    - -- determination that worker can use respiratory protection (if applicable)
    - -- determination of physical condition to withstand stresses such as heat stress
    - -- determination of acute exposures to hazardous substances while working on-site
    - -- follow-up examinations (if applicable)
12. Documentation of the various elements of safety plan and site activities

SITE SAFETY PLAN OUTLINE AND GUIDANCE FOR SITE ASSESSMENT OR SITE MITIGATION PROJECTS

Toxic Substances Control Division

This document is intended to assist contractors and responsible parties in preparing site safety plans (SSP's) for Toxic Substances Control Division projects. This guidance is not necessarily all-inclusive. The type of plan required and its content will vary on a site-specific basis. However, most SSP's will need to address, at a minimum, all of the topics listed in the SSP Outline below; if a topic area does not relate to the project, a negative declaration should be included to establish that adequate consideration was given to the topic.

A well-written SSP should be a stand-alone document that serves a multitude of purposes. While assuring the governmental agencies involved that both worker and community health and safety concerns are properly addressed, it should also provide site management with information that is sufficiently detailed to permit implementation of all health and safety functions at the site. A reference copy of the SSP must always be available at the site for this purpose. The SSP must also provide site workers with appropriate health and safety guidance, and be useful for training the workers in the hazards specific to the particular job.

It is advisable to have the SSP developed by industrial hygiene and safety personnel who have hazardous waste site experience. A suggested reference for use in preparing SSP's is the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985, DHHS (NIOSH) Publication No. 85-115.

I. SSP Outline

1. Facility Background
2. Key Personnel and Responsibilities
3. Job Hazard Analysis
4. Risk Assessment Summary
5. Air Monitoring Plan
6. Personal Protective Equipment
7. Work Zones and Security Measures
8. Decontamination Procedures
9. General Safe Work Practices
10. Emergency Response Plans
11. Training Requirements
12. Medical Surveillance Program
13. Documentation
14. Regulatory Requirements

II. Guidance Information

1. Facility Background

If the SSP is not an integral part of a workplan, this section of the SSP should be devoted to a description of the project, including field activities and goals. Further, it should include a summary of information regarding wastes disposed of on-site, location and physical state of wastes, chemical characteristics of wastes, and range of concentrations found to date by matrix.

2. Key Personnel and Responsibilities

Identify key personnel by name and specific assignment for the project (i.e., Joe Smith, Project Manager, Harry Jones, Site Safety Officer, etc.). Summarize the health and safety responsibilities of each key person identified. Include the telephone numbers of key contractor/responsible party and agency personnel.

3. Job Hazard Analysis

This section is necessary to provide summary information on potential hazards to workers at the site. Describe potential chemical hazards based on contaminants present or expected, and the primary health risks associated with each; include PELs/TLVs for each contaminant as appropriate. Describe physical hazards associated with each site activity (i.e., trenching, drilling, sampling) and steps to be taken to minimize these hazards.

Provide anticipated weather conditions, including historic mean temperatures and relative humidities. If heat stress potential is indicated (ambient temp >70F), discuss its monitoring and control. In colder regions, give consideration to cold stress potential.

Where trenching or drilling will be conducted, ensure that Underground Service Alert (USA) is contacted for guidance regarding underground utilities. Article 6 of the Construction Safety Orders contains specific regulatory requirements for trenching operations.

Some large/prolonged/complex site mitigation projects will require a more detailed job hazard analysis for each job classification on the project.

4. Risk Assessment Summary

Provide a summary of the potential risks/impact on receptors at or near the site. This will include impact on workers, nearby/surrounding community, and environment. This section is very dependent on the availability of data and specifics regarding the site; therefore, based on the phase of the project (i.e. initial site assessment) it may not be possible to include this information.

5. Air Monitoring Plan

Describe area, worker, and community air monitoring programs. This should include rationales, methodologies, equipment calibration procedures for each, and locations for area and community monitoring. Include decision matrices for action level determinations. Depending on the geographic location of the site, area and community monitoring of the site may not be applicable. If the operation requires a local air quality agency permit which outlines community air monitoring criteria, provide a copy of the permit as an appendix.

6. Personal Protective Equipment (PPE)

Discuss protective clothing and respirator selection. This must be more specific than "chemical resistant" coveralls, gloves, etc., and should include rationale for selection.

For respirator use, include odor threshold of gases and vapors, vapor pressure, and PEL/TLV of each hazardous constituent of primary concern, as well as action levels for upgrade or downgrade.

The section should include a list of PPE selected for each job classification at the site if there are different levels of protection being specified.

7. Work Zones and Security Measures

Provide a site and area map with work, contamination reduction and support zones outlined. Indicate decontamination area. Define site control/security measures; these include items such as fencing, locked gates, security guards, flagging, etc.

8. Decontamination Procedures

This section will describe decontamination (decon) procedures to be used for personnel, personal protective equipment, sampling equipment, and heavy equipment. Detail the decon procedures, including how decon line and rest area will be set up, provisions for disposal of contaminated materials and water, and a listing of decon equipment and solutions that will be used (i.e. soap and water, steam cleaner, etc.)

9. General Safe Work Practices

This section should establish Standard Operating Procedures (SOP's) for activities that can be standardized due to their repetitive nature. A checklist is advisable because it is useful in the field for daily checks of working conditions. If such safety SOP's are provided through a corporate health and safety program/manual, these can be referenced in the SSP, and a copy of the manual provided for review.

10. Emergency Response Plans

This is another section of the SSP which is very dependent on the specifics of the site and the phase of the project. At a minimum, it should describe medical and emergency services to be used, including a list of emergency contact telelphone numbers and the route to the nearest emergency room. Personnel with current CPR/First Aid training need to be identified. Decontamination requirements for personnel injured or exposed in the work zone will be provided.

As applicable, based on the project, develop contingency plans for on-site and off-site spills or releases of hazardous materials which will include evacuation plans for site and surrounding areas.

11. Training Requirements

This section should describe personnel training programs, which should include as a minimum, health hazard recognition training, physical agent (safety) training, respiratory protection training, equipment training, safe work practices, first aid/CPR, and personal hygiene. Procedures for daily/pre-shift tailgate safety meetings should be discussed.

Cal/OSHA requires specialized training be given when handling specific materials, and that personnel are trained in the hazards specific to their job.

If the details on such a training program are provided through a corporate health and safety program/manual, this can be referred to in the SSP, and a copy of the program or manual provided for review. The SSP should include training needs over and above the basic corporate program which are specific to the project.

12. Medical Surveillance Program

Any contractor/subcontractor who has employees working at hazardous waste sites should have an established medical surveillance program in place. At a minimum, the corporate program should include a determination that a worker can use respiratory protection devices; a determination of physical condition to withstand stresses such as heat stress; establish baseline conditions for hearing and visual acuity; blood tests and urinalysis; and provisions for followup/periodic examinations.

If such a program is included in the corporate health and safety program, it may be referenced as such in the SSP and a copy of the program submitted for review. However, appropriate tests or examinations for acute exposures to specific potential hazards from the work at hand should be discussed in this section of the SSP.

13. Documentation

There are many requirements in the Cal/OSHA health and safety regulations (CAC, Title 8) covering recordkeeping. Such items include worker exposure monitoring, medical surveillance, training, respiratory protection, and injuries/illnesses. Standard formats for these requirements should be established by the corporate health and safety program/manual. These can be referenced in the SSP, and a copy of the manual provided for review.

14. Regulatory Requirements

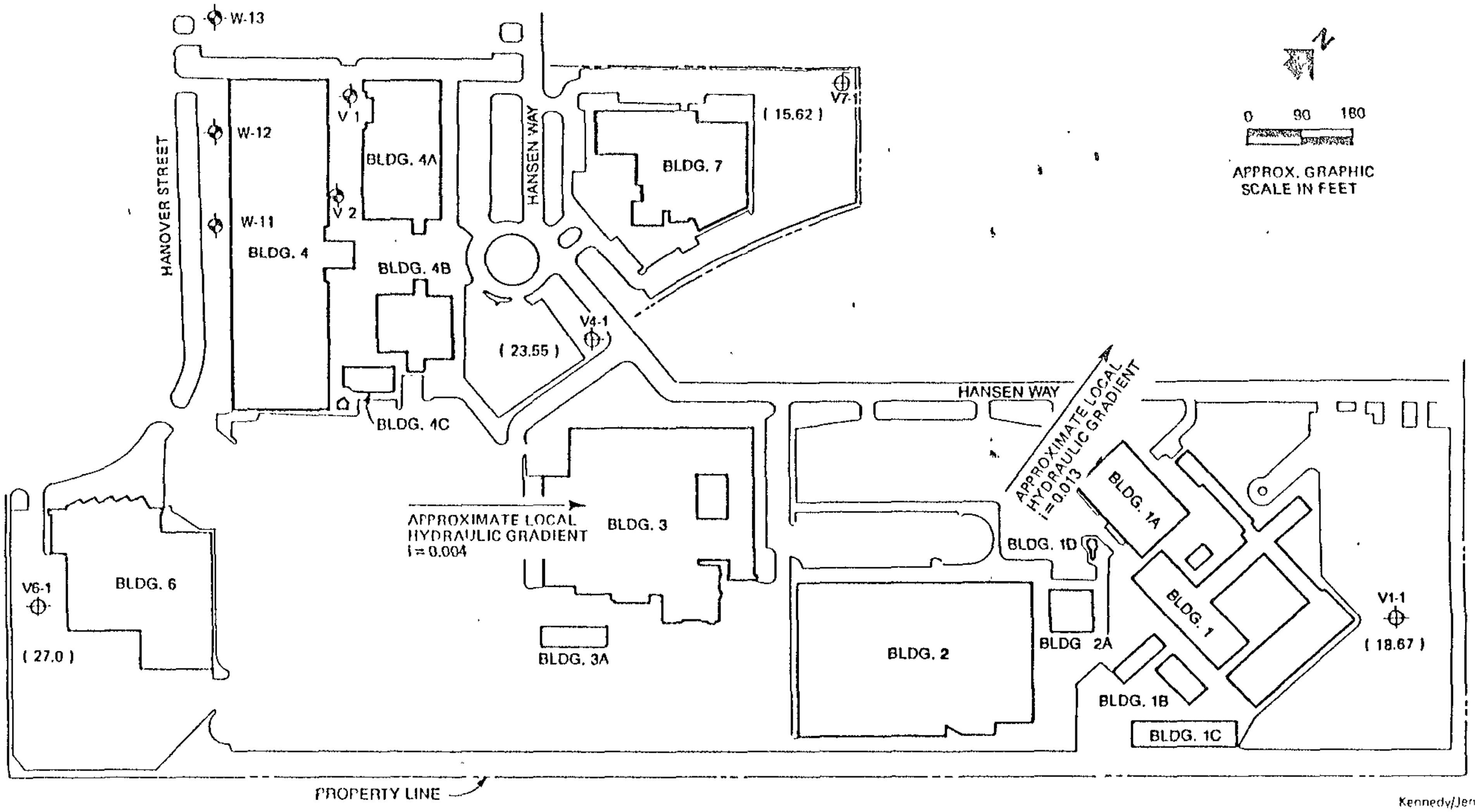
California Administrative Code, Title 8, General Industry Safety Orders sets out specific industrial hygiene, safety and medical monitoring requirements that are to be adhered to when working with designated hazardous materials. Frequently these procedures state that they do not apply to the construction industry. Cal-OSHA does not recognize hazardous waste site work as being in the construction industry; therefore, it is incumbent upon contractors/responsible parties to ensure that SSP's for site that contain any of these materials are in compliance with applicable regulations.

III. Resources

The TSCD staff includes industrial hygienists in each Regional Office who are available to assist in the development of SSP's. The primary responsibility for the SSP lies with the contractor/responsible party. However, the TSCD industrial hygienists are responsible for review and approval, prior to any site activities, of the SSP and any other health and safety considerations for a specific project. Verbal communications between the parties preparing the SSP and TSCD industrial hygienists is encouraged as this usually results in more expeditious approval of the SSP, which will then decrease the waiting period before site activities can begin.

In terms of written materials, the EPA provides additional guidance documents regarding site safety and SSP development.

Contractors who are working directly for the TSCD should consult their contracts or task orders for items which may be required in an SSP over and above the basic requirements detailed in this document.



LEGEND

(27.0)	WATER LEVEL MEASUREMENTS (FEET MSL) (11/13/86)
-⌀-	VARIAN MONITORING WELL
-●-	MONITORING WELL INSTALLED BY OTHERS

NOTE:

ALL LOCATIONS APPROXIMATE.

CALCULATED HYDRAULIC GRADIENT IN VICINITY OF BLDG. 3 BASED ON WATER LEVELS IN V1-1, V4-1 AND V6-1.

CALCULATED HYDRAULIC GRADIENT IN VICINITY OF BLDG. 1 BASED ON WATER LEVELS IN V1-1, V4-1 AND V7-1.

Kennedy/Jenks/Chil

Varian Associa
611 Hansen V
Palo Alto, Califr

Water Level Elevation M

K/J C 60
December 19

Figure

Kennedy/Jenks/Chilton

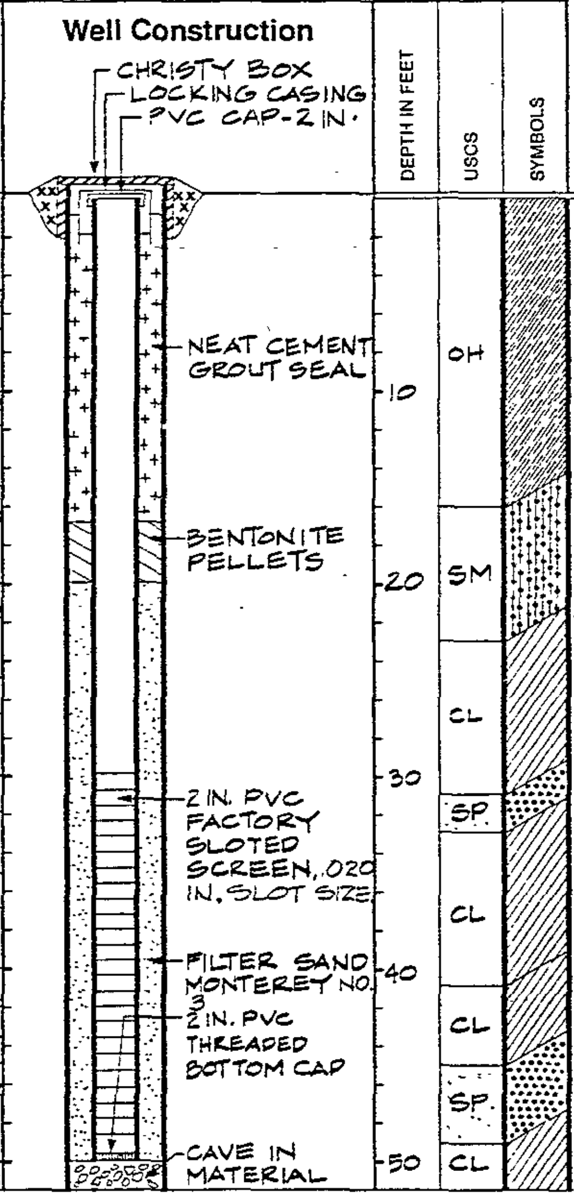
PROJECT: VARIAN ASSOCIATES
JOB NO: 6072
DATE: 10/31/86
BY: TCS

Monitoring Well: V6-1

Details of Boring and Well Construction

SURFACE ELEVATION: 49.5 FT. TOP OF CASING (MSL)
DRILLING METHODS: 5 IN. O.D. HOLLOW STEM AUGER
SAMPLING METHODS: 2.5 IN. I.D. CAL. MOD. SAMPLER WITH BRASS LINERS
DRILLER: HEW DRILLING

SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT/INTERVAL
V61-1A	C.M.	9 12 16
V61-2A	C.M.	8 17 20
V61-3A	C.M.	16 23 36
V61-4A	C.M.	9 13 16
V61-5A	C.M.	12 14 23
V61-6A	C.M.	9 28 50
V61-7A	C.M.	10 24 40
V61-8A	C.M.	9 19 29
V61-9A	C.M.	5 14 17
V61-10A	C.M.	10 16 23
V61-11A	C.M.	12 18 25



SANDY GRAVELLY CLAY: DARK BROWN-BLACK, MOIST, BECOMING SILTY WITH DEPTH.

SILTY SAND: BROWN - RUSTY, SATURATED.

∇ SANDY SILTY CLAY: TAN - LIGHT BROWN, MOIST - SATURATED.

GRAVELLY CLAYEY SAND: BROWN, SATURATED.

SILTY SANDY CLAY: TAN - BEIGE, MOIST.

SANDY SILTY CLAY: TAN - GRAY, MOIST - DRY.

GRAVELLY SAND: BLUE - GRAY, SATURATED.

SANDY CLAY: BLUE - GRAY, MOIST.

BOTTOM OF HOLE @ 51.5 FT.

WATER LEVEL MEASUREMENTS OBTAINED 11/13/86

C.M. = CALIFORNIA MODIFIED

SHEET 1 OF 1

Kennedy/Jenks/Chilton

PROJECT VARIAN ASSOCIATES

JOB NO 6C72

DATE 10/24/86

BY TCS

Monitoring Well: V1-1

Details of Boring and Well Construction

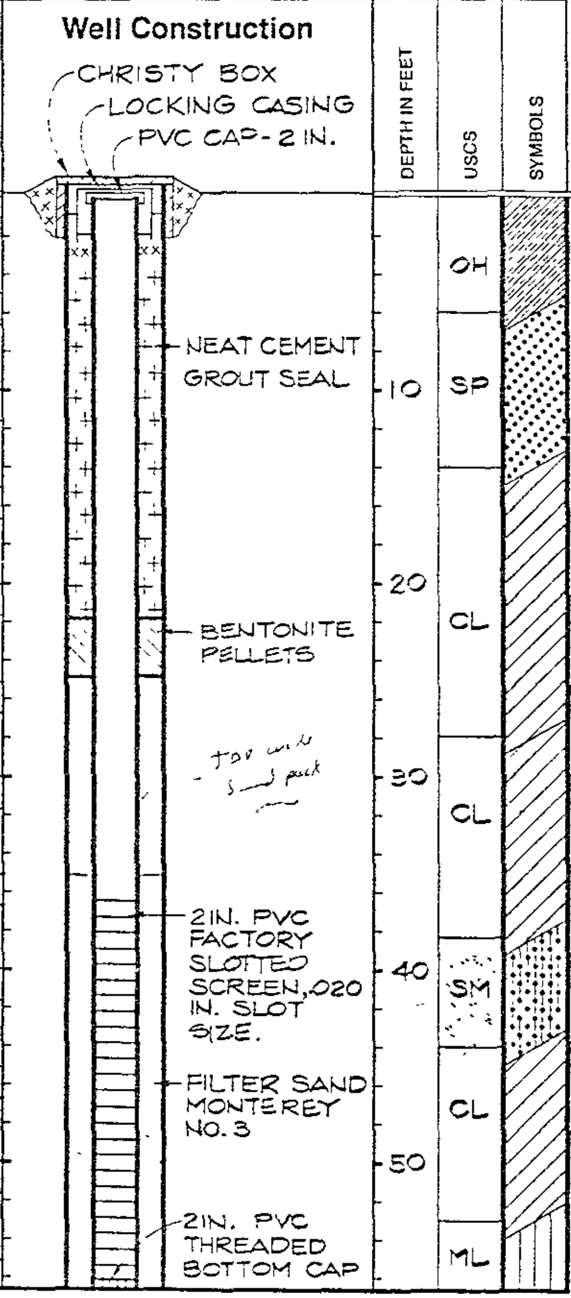
SURFACE ELEVATION. 35.09 FT. TOP OF CASING (MSL)

DRILLING METHODS: 8 IN. O.D. HOLLOW STEM AUGER

SAMPLING METHODS 2.5 IN. I.D. CAL. MOD. SAMPLER WITH BRASS LINERS

DRILLER: HEW DRILLING

SAMPLE NUMBER	SAMPLER TYPE	BLOWS/FT-INTERVAL
VII-1	C.M.	10 15 22
VII-2	C.M	6 11 15
VII-3	C.M.	7 9 11
VII-4	C.M.	5 6 7
VII-5	C.M.	6 9 7
VII-6	C.M.	7 7 8
VII-7	C.M.	6 8 9
VII-8	C.M.	9 12 19
VII-9	C.M.	6 7 9
VII-10	C.M.	7 9 13
VII-11	C.M.	9 11 14



SILTY CLAY: DARK BROWN-BLACK, MOIST-DRY

GRAVELLY CLAY SAND: MEDIUM BROWN, MOIST, FINING UPWARDS.

∇

SANDY SILTY CLAY. TAN LIGHT BROWN. MOIST, BECOMMING LESS SILTY WITH DEPTH, INCREASING WHITE MOTTLING WITH DEPTH.

SILTY SANDY CLAY: LIGHT GRAY, MOIST.

SILTY CLAYEY SAND: BLUE-GRAY, SATURATED.

SILTY CLAY: DARK GRAY, MOIST

GRAVELLY CLAYEY SILT: DARK GRAY, MOIST - SATURATED,

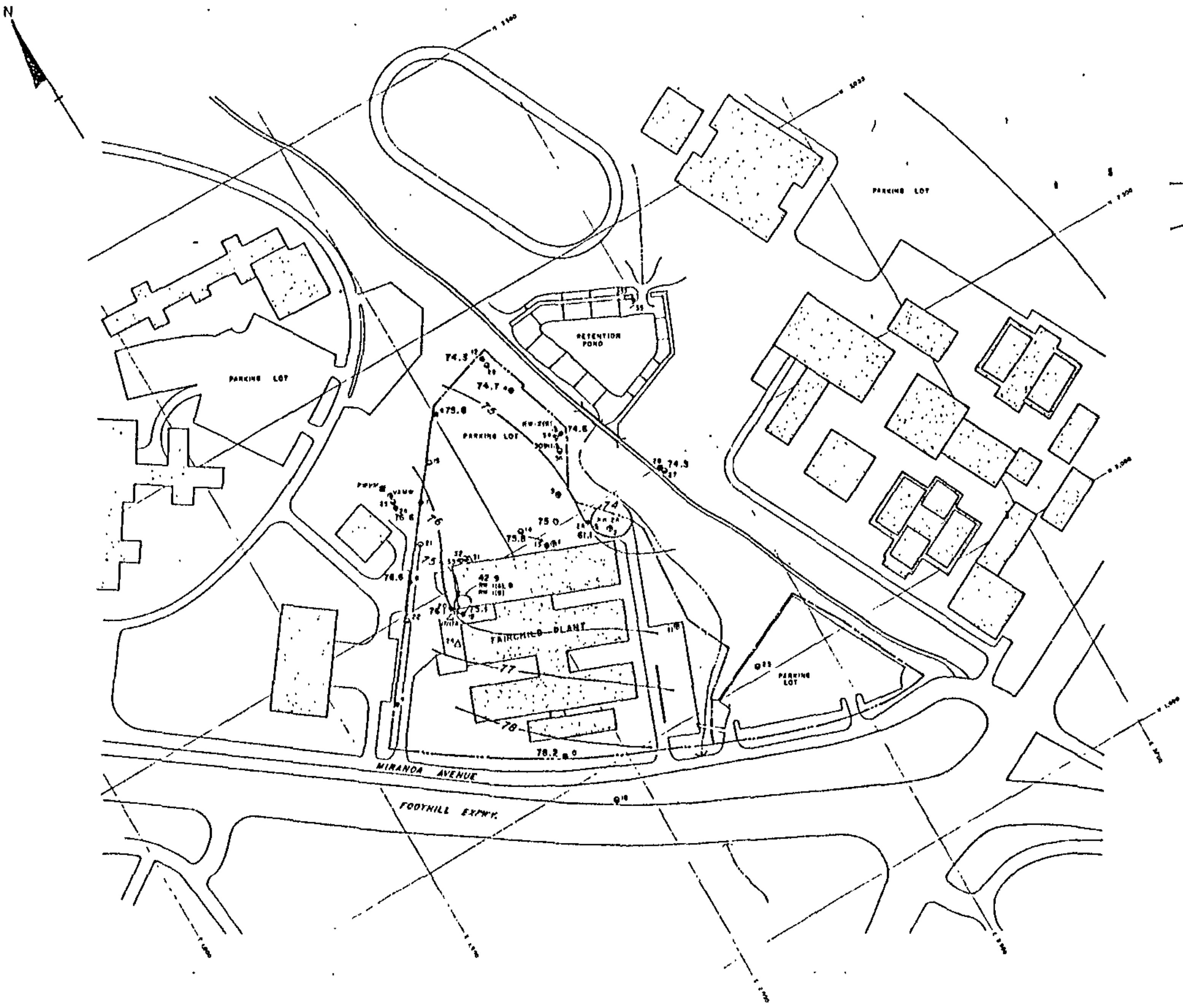
BOTTOM OF HOLE @ 56.5 FT

WATER LEVEL MEASUREMENTS OBTAINED 10/27/86

C.M. = CALIFORNIA MODIFIED

F-37
(8/85)

SHEET 1 OF 1



SHALLOW ZONE GROUND WATER
CONTOURS MARCH 30, 1987

FAIRCHILD R&D DIVISION
PALO ALTO, CALIFORNIA
PREPARED FOR

FAIRCHILD
SEMICONDUCTOR CORP.

CanonieEnvironmental

DATE 4-7-87 SCALE AS SHOWN	FIGURE 9	DRAWING NUMBER 82-063-E78

APPENDIX M

Design Objectives of the Bypass Intake-Diversion Outlet

Design Concept

The Barron Diversion and Matadero Bypass Channels have been designed to work together as a flood conveying facility. The basis of design and operation of the Barron Diversion is explained in Appendix J. This Appendix focuses specifically on the interrelationship of these two channels. Because of the complexity of the bypass intake and diversion outlet, a physical hydraulic model study will be performed.

Design Constraints

During low flows, water from the Barron Creek system will flow through the sediment basin without diversion. Low flows in Matadero Creek will remain in the natural channel. Higher flows will enter the Matadero Bypass.

When the flow rate in Barron Creek at the sediment basin exceeds about 160 cfs, water will begin to enter the Barron Diversion Channel and flow downstream into the Matadero Bypass. At about the same flood frequency (5-year event ±) on Matadero Creek, 300 cfs will be flowing down the natural creek upstream of Bol Park and flows will just begin to enter the Matadero Bypass Channel. The diversion flows will combine with the bypass flows just north of Matadero Creek in Bol Park.

Model Study Guidelines and Objectives

The objectives of the hydraulic model study are:

1. To verify performance of the confluence of the Barron Diversion and the Matadero Bypass during intermediate events (10-year to 50-year frequencies).
2. To verify performance at the 1% design level where Matadero Creek flow is 2,200 cfs and the diverted Barron flow is 600 cfs. Flow rate in the natural Matadero Creek downstream of the bypass should be 1,300 cfs. The flow rate entering the bypass from Matadero Creek should be 900 cfs with another 600 cfs adding at the confluence with the Barron Diversion Channel. From the

bypass-diversion confluence to the Stanford Channel outfall, the design flow rate is 1,500 cfs.

3. Finally, to verify that under events exceeding the 1% design flow rates that if any flooding or overflow occurs, it will take place in the historic floodplain of the respective creeks and not subject areas to flooding that were not previously subject to 1% flooding.

APPENDIX N

NEGATIVE DECLARATION

NEGATIVE DECLARATION

Project: Matadero and Barron Creeks Flood Control Project.

Location: Matadero Creek from just below Bayshore Freeway to the Foothill Expressway, a parallel bypass channel from El Camino Real to the Veterans Administration Hospital, and a diversion channel linking Barron Creek and Matadero Creek adjacent to the Veterans Administration Hospital, in the city of Palo Alto.

Purpose: The proposed project is designed to protect the Matadero Creek floodplain from a 1% flood originating from Matadero Creek. The inclusion of Barron Creek floodwaters would alleviate flooding originating from Barron Creek as well.

The project would also facilitate the removal of sediment, debris, and vegetation that impede flood flows in the channels.

Descripting of Project: The project area has been divided into 11 reaches. Proposed measures in Reaches 1 through 6 consist of the addition of floodwalls, bridge replacements, and some channel replacement. New bridges will replace inadequate cullverts. The existing earth channel bottom in the vicinity of Bayshore Freeway would be concrete-lined to allow access by maintenance equipment. Floodwalls two to three feet high would be added to the top of the existing channel to provide the necessary freeboard required to meet FEMA standards. Some portions of the existing concrete trapezoidal channel would be removed and replaced with a new vertical-wall channel section.

Where new bridges are proposed, the existing road grades would be retained with the exception of Park Boulevard. Upstream of El Camino Real, the natural creek would remain generally undisturbed with the exception of isolated gabion or sacked concrete bank protection. An underground box culvert bypass would allow the retention of these near-natural creek corridors.

An underground diversion channel is proposed to carry floodwaters from Barron Creek to Matadero Creek which would have sufficient capacity to safely pass high flows. A detailed reach by reach description of the proposed project is contained in the Engineer's Report.

Findings: The Santa Clara Valley Water District Board of Directors, having reviewed the Initial Study for the proposed project, and having heard at a public meeting of the Board, the comments of all concerned persons and entities including the recommendations of staff, does hereby find and declare that the proposed project, which inlcudes the mitigation measures described in the Initial Study, will not have a significant effect on kthe environment. Consequently, a Negative Declaration is appropriate.

Basis of Findings: Most of the adverse impacts of the proposed project would be temporary since they are related to construction activities. During construction, nearby residents would be subjected to high levels of noise, dust, traffic delays, auto and bicycle route detours, congestion at bridge crossings, and visual degradation. Construction would be implemented on a phased basis over five years so that the entire project area would not be disrupted at once. Construction would proceed from downstream to upstream to avoid inducing downstream flooding.

Long-term minor impacts would result from the removal of a small amount of riparian vegetation in the upper portion of the project area, and the removal of native and introduced trees and shrubs along the Stanford Channel and a bicycle path located along the Matadero Bypass route. The loss of riparian vegetation is not considered a significant impact given the scattered pattern of removal within well-vegetated corridors. The removal of landscaping plant material will be mitigated by an extensive revegetation program. There is a potential for disturbance to archeological resources; however, mitigation measures will be implemented which should reduce such impacts to a minor level.

INITIAL STUDY

ENVIRONMENTAL IMPACT ASSESSMENT CHECKLIST

Explanations of all "Yes" and "Maybe" answers are required on attached sheets. If impact occurs during construction or is temporary, indicate with a "C" or "T" under Yes or Maybe.

	Yes	Maybe	No
1. Geology and Soils. Will the project result in:			
a. An increased hazard to the public resulting from geologic features of the site (landslide-prone areas, faults, slumping, etc.)?			X
b. Serious disruptions, displacements, compaction, or impervious covering of the soil?	X		
c. Introduction of toxic materials in the soil or reduction of soil fertility?			X
d. Significant change in topography or ground surface relief features?			X
e. The destruction, covering or modification of any unique geologic or physical features?			X
f. Any substantial increase in wind or water erosion of soils, either on or off the site?		T	
g. Changes in siltation, sediment transport, deposition or erosion which may modify a river, stream, or other body of water?			X
2. Air. Will the project result in:			
a. Generation of air emissions (such as dust) that will seriously deteriorate air quality standards (either locally or regionally)?		C	
b. The creation of objectionable odors?			X
c. Major alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?			X

	Yes	Maybe	No
3. Water. Will the project result in:			
a. Changes in currents, or the course or direction of water movements?	X		
b. Changes in infiltration rates, sedimentation, drainage patterns, or the rate and amount of surface water runoff?	X		
c. Alterations in the course or flow of floodwaters?	X		
d. An increase in downstream flood potential that might cause property damage?			X
e. Change in the amount of surface water in any body of water?			X
f. Contamination or any detrimental effect on existing water quality or quantities of either surface or subsurface supplies?		X	
g. Change in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?			X
h. Reduction in the amount of water otherwise available for public water supplies?			X
4. Noise. Will the project increase existing noise levels during construction or operations to the extent that existing or future residents would be annoyed?	C		
5. Plant Life. Will the project result in:			
a. Change in the diversity of species, or numbers of any species of plants (including trees, shrubs, grasses, microflora, and aquatic plants)?	X		
b. Reduction of the numbers of any unique, rare or endangered species of plants?			X
c. Introduction of new plant species into an area, or a barrier to the normal replenishment of existing species?	X		

	Yes	Maybe	No
6. Animal Life. Will the project result in:			
a. Changes in the diversity of species, or numbers of any species of animals (birds, land animals, including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?	X		
b. Loss or disturbance of a nesting area for resident or migrating birds?	X		
c. Reduction of the numbers of any unique, rare or endangered species of animal?		X	
d. Introduction of new species of animal into an area, or result in a barrier to the migration or movement of animals (or fish)?			X
e. Deterioration of existing fish or wildlife habitat?			X
7. Land Use/Community Plans and Values. Will the project result in:			
a. Alteration or nonconformance with regional, federal, state or local land use plans and policies of the surrounding area?			X
b. Conflict or inconsistency with adopted policies, plans and goals of the community where the project is located?			X
c. Deterioration of the integrity or quality of the surrounding neighborhood? Loss of privacy or security to residents over the long term?			X
d. Generation of a substantial public controversy resulting from environmental concerns?	X		

		Yes	Maybe	No
8.	Economic. Will the project:			
	a. Foster economic or population growth, either directly or indirectly, in the surrounding area (particularly if faster than planned for)?			X
	b. Remove a major constraint or obstacle to growth?			X
	c. Decrease employment in the community?			X
	d. Reduce acreage or yield of an agricultural crop?			X
9.	Population. Will the location, distribution, character, or density of the surrounding human population be altered by the project?			X
10.	Housing. Will the project adversely affect existing housing or result in the relocation of existing housing?			X
11.	Transportation/Circulation. Will the project result in:			
	a. An adverse impact upon existing transportation systems?	T		
	b. Reduction in existing parking facilities, or create demand for new parking?	T		
	c. Alterations to present patterns of circulation or movement of people and/or goods?	T		
	d. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?	T		
12.	Public Services. Will the project result in a need for new or altered governmental services in any of the following areas:			
	a. Fire or police protection?	X		
	b. Schools?			X
	c. Parks or other recreational facilities?			X

	Yes	Maybe	No
d. Maintenance of public facilities (streets, highways, public transit, etc.)?	X		
e. Flood Protection?	X		
f. Other governmental services?	X		
13. Utilities. Will the project result in a need for new systems, or alterations to the following utilities:			
a. Power or natural gas?		T	
b. Communications systems?		T	
c. Water?		T	
d. Sewers or septic tanks?		T	
e. Storm water drainage?		T	
f. Solid waste disposal?			X
14. Energy. Will the project result in:			
a. Use of substantial amounts of fuel or energy?			X
b. Substantial demand upon existing sources of energy, or require the development of new sources of energy?			X
15. Public and Environmental Health. Will the project result in:			
a. Creation of any known human health hazard or potential health hazard (excluding mental health but including physical injury)?		X	
b. Involve the application, use, or disposal of toxic or hazardous materials?		X	
16. Aesthetics. Will the project result in the obstruction or elimination or any scenic vista or view open to the public, or will the project result in the creation of an aesthetically offensive site or structure presently or potentially open to public view?	T		

		Yes	Maybe	No
17.	Recreation. Will the project result in an impact upon the quality or quantity of existing recreational opportunities (such as fishing, boating, hiking, horseback riding, bicycling)?	T		
18.	Archeological/Historical. Will the project result in an alteration of a significant known archeological or historical site, structure, object or building? Is the project in a known archeologically sensitive area?	X		
19.	Natural Resources. Will the project substantially increase the consumption of an non-renewable natural resource such as minerals, precious metals, prime agricultural land, natural gas, oil, etc.?			X
20.	Mandatory Findings of Significance.			
	a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?			X
	b. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)			X
	c. Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environment is significant.)			X

DETERMINATION

On the basis of this Initial Study:

☐ I find the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described have been added to the project.

☐ I find the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Dr. Bernard H. Goldner
Prepared by

Environmental Specialist
Title

Date: October , 1987

And

Michael Marangio
Harvey & Stanley Associates, Inc.

ENVIRONMENTAL EVALUATION

1. Geology and Soils

Removal and replacement of portions of the existing trapezoidal concrete channel and replacement of bridges with associated excavation and grading would temporarily disrupt and compact soil. The construction of the underground bypass and diversion channels would also result in excavation and compaction of soils. Widening of the channel in small portions of the upper reaches may increase erosion on these disturbed soils until these areas revegetate. Bank protection measures where proposed would reduce channel erosion over the long-term.

Because excavation and construction activities are proposed primarily for areas previously disturbed, no significant impacts would result. Temporary erosion may result from widening of creek banks. This potential temporary impact would be mitigated by the use of erosion control methods implemented before the first autumn rainfall.

2. Air

During construction, air quality would deteriorate in the project vicinity as a result of the emission of exhaust fumes from construction machinery and support vehicles, and from the production of dust. Dust would produce a temporary annoyance to home residents adjacent to the creek bypass and diversion channels. Dust woulld be kept to a minimum by the contractor as part of contract specifications. Mitigation would involve wetting exposed soil surfaces to reduce dust generation, limiting grading activities on excessively windy days, and frequent street cleaning in the construction areas.

3. Water

The construction of the underground Matadero Bypass channel would change the course and drainage pattern of Matadero Creek by diverting a portion of the high flows to a parallel route that would re-enter the main channel at a point where capacity would be sufficient. In addition, the diversion of water from Barron Creek into Matadero Creek would change the course and natural drainage pattern by allowing waters from one watershed to enter another. Small changes in the alignment of Matadero Creek are also proposed which involve reducing the number of sharp turns. None of these activities would result in significant negative impacts. Flooding would be significantly reduced in the project area, resulting in positive impacts related to flood hazards.

There is a slight potential for contamination of Matadero Creek waters if toxic materials are encountered in soils where excavation is proposed. Where bridges, underground culverts, and existing concrete channels are to be replaced, groundwater that is contaminated with TCE or other toxic chemicals may be encountered. In addition, soils contaminated with toxic chemicals may also be exposed. Soil and groundwater samples along the construction area right of way would be analyzed by the District to test for hazardous chemical contamination prior to construction where the potential for this possibility occurs (based on known toxic contamination sites nearby). In the event that contaminated samples arre found, a contingency plan for the containment or disposal of the hazard would be developed under the guidelines set by the State Department of Health Services and the Regional Water Quality Control Board.

4. Noise

Heavy machinery used during construction would temporarily increase the level of noise in the site vicinity which is likely to disturb residents located within 100 feet of the active construction area, and to a lesser degree, disturb residents up to 400 feet from the site.

A sound barrier is located along the Varian property adjacent to the proposed bypass channel. Because channel construction would require opening sections in this wall, additional temporary noise from the Varian facilities would impact nearby residences during the construction period. The noise impacts from construction and from Varian are short-term and are thus not considered significant.

5. Plant Life

Much of the project lies within portions of Matadero Creek which are constructed flood control channels lined with concrete. These channels are periodically maintained to remove sediment and vegetation interfering with flood flows. Thus any project activitiess that would affect vegetation within these channels would not have significant impacts. The loss of trees and shrubs along the Matadero Bypass alignment would have adverse impacts. Trees and shrubs would be replanted, however, mitigating these impacts. (Refer to attached Matadero Creek Biological Impact Assessment for details).

New plant species maay be introduced into areas that are revegetated. Although many will be native California species found in nearby areas, other ornamental species aappropriate for conditions available may also be used.

The disturbance resulting from excavation in open areas such as along the bike path in Bol Park could encourage the spread of locally established weeds such as yellow star thistle and fennel. Mitigation for this potential impact would be accomplished by reseeding and maintenance of grasses and other herbaceous species. The application of appropriate herbicides would also reduce weed overgrowth.

6. Animal Life

The elimination of landscaped corridors along the proposed bypass within the Stanford Channel area and along the bike path north of Matadero Avenue would reduce the numbers of birds and other wildlife that require this habitat. Revegetation would mitigate for the impacts of lost wildlife habitat. Bridge replacements could reduce nesting habitat for migratory birds such as Barn Swallow, Cliff Swallow, and Black Phoebe. Mitigation of these impacts would require that construction activities be limited to the summer season after nesting has been completed or prevention of nesting prior to construction. Certain migratory birds are protected under the Federal Migratory Bird Treaty Act and cannot be taken without a U.S. Fish and Wildlife Service Permit.

The creek is not known to support an anadromous fishery.

The potential presence of the rare San Francisco forktail damselfly (Ischnura gemina) was investigated. No adults or larvae were found on portions of the creek where the stream bottom would be disturbed by construction activities. For this reason, it is assumed that this species is unlikely to occcur there, and that no impacts are likely to result to this species from proposed project activities. (Refer to the attached Matadero Creek Biological Assessment for further details).

7. Public Controversy

The proposed construction of the Matadero bypass (reach 7B) has resulted in objection by adjacent homeowners concerned with construction impacts and loss of screening vegetation within the Stanford Channel right of way. Realigning the A portion of the bypass channel within the varian parking lot has reduced, but not eliminated these concerns.

11. Transportation and Circulation

Two bridge constructionn alternatives are being considered: 1) closure of Greer, Louis and Ross bridges during construction or 2) staged construction of the bridges while permitting traffic across the bridges. The comparative impacts of both options are shown in the attached table. A decision as to which alternative will be selected will be made subsequent to a public meeting to be held December 9 and prior to completion of the final Negative Declaration. A cumulative traffic impact analysis prepared by the consulting firm of CH2M Hill is attached.

Railroad traffic along SPRR would be maintained by employing construction techniques that would not impact trains. This work will be closely coordinated with the Southern Pacific Transportation Company.

A traffic control plan would be developed in coordination with the District, City of Palo Alto, and the construction contractor prior to construction.

The construction of the Matadero Bypass through the parking lot at Varian would result in t he temporary loss of approximately 100 parking spaces where construction activity would occur. In addition, about 50 more spaces would be lost for the staging area. A total of about 150 spaces would thus be eliminated for a period of about 6 months. Presently, this parking lot is underutilized and thus would accomodate workers at Varian even with the proposed loss of parking spaces. However, Varian may expand its work force in the next three years, which would require the need for these spaces.

Because the loss of spaces would cause an inconvenience to workers at Varian should employee numbers increase prior or during the construction period, measures would be necessary to reduce the impact. If parking becomes limited, additional parking spaces could be provided by restriping portions of the parking lot for the 6 month construction period. Substandard stall size and arrangement could increase the number of cars that can be parked on the site. The number of parking stalls eliminiated at one time could be reduced by staging the construction in this area in two phases. However, this would probably only reduce the loss to about 100 stalls. Arrangements would have to be made in coordination with the District, Varian, and the contractor.

Where a box culvert is proposed beneath the Watkins Johnson site, approximately 25 parking places would be directly displaced by excavation for the underground box culvert between stations 267 and 268. Construction equipment storage could also eliminate approximately 25 more parking stalls. In addition, access between a series of parking lots on the Watkins Johnson site could be disrupted if the driveway was bisected for the culvert construction. The loss of approximately 50 parking spaces would result in an inconvenience to workers who would be required to park up to 3/4 of a mile away from the building in which they work (David Burnham, Manager of Services and Planning, Watkins Johnson. Telephone conversation, September 25, 1987). Blocking of access to the parking lots to the north would seriously disrupt parking for many employees.

Pedestrian circulation between buildings could also be disrupted if a covered walkway between two buildings were closed during construction.

To mitigate for these impacts the following could be done:

> To mitigate for inconvenience to employees who would have to park in outlying parking lots, the central parking lots should, if feasible, be re-striped to accomodate more autos temporarily, during the construction period.

> To maintain automobile access between all parking lots on the site, the driveway access should be maintained by temporarily bridging the channel excavation to allow car movement through the area.
>
> To maintain pedestrian access between buildings, the box culvert should be tunnelled beneath the covered walkway.

Approximately ten parking spaces at the Veterans Administration Hospital would be temporarily lost during construction of an underground culvert at approximately Station 266. The loss of this small number of parking places is not considered significant.

A slight temporary increase in traffic hazards, primarily to motor vehicles, would result from the phased replacement of bridges along the project alignment. This would be the result of narrower lanes across the bridge span and the fact that traffic lanes would curve to one side of the bridge. Warning signs notifying traffic of bridge construction would be posted. No significant impacts would result.

IMPACT ANALYSIS

Road Closure Versus Staged Construction at Greer Road, Louis Road and Ross Road

Alternative Impact	Road Closure	Staged Construction (Construction under Traffic)
Time of Construction	Approximately 3 months each for Greer, Louis and Ross Bridges. The three bridges will be done one at a time.	Approximately 6 months each for Greer, Louis and Ross bridges. The three bridges may be done at the same time.
Cost of Construction	Approximately $200,000 construction cost savings. ($60,000 to $70,000 savings for each site)	Construction cost is approximately $200,000 more than road closures.
Trees, Lawns of Immediate Residents	Will impact only area immediately adjacent to the bridges.	Will impact trees, lawns & driveways within 125'± from centerline of creek.
Traffic	Pedestrians, bikes and cars will be re-routed to adjacent streets. Adjacent streets have adequate capacity for the additional traffic. Residents along adjacent streets will experience some increase in through traffic. Entire area affected up to 9 months.	Traffic will be accommodated through construction site. Adjacent streets will have some increase in thru traffic volume due to the inconvenience of passing through construction site. Entire area affected up to 18 months.
Emergency Access	According to Palo Alto Fire Department, will require 45-60 more seconds for response time which is within the accepted normal response time. All agencies will be notified regarding times of closures.	No significant impact.

12. Public Services

If bridges are closed to traffic, access for fire and police protection and for school bus routes would be altered. A traffic control plan, developed in coordination with the District, City of Palo Alto, and the construction contractor, would reduce any potential impacts of traffic disruption as it relates to public service.

As a result of the acquisition of easements along the upper portions of Matadero Creek, along with easements for the bypass and diversion alignments, the District will increase its responsibilities for flood protection in these corridors. Increased maintenance of channels would result, along with potential emergency repair work on existing and proposed construction. No significant impacts are associated with these additional responsibilities.

13. Utilities

There is a potential for temporary disruption of gas, electricity, telephone, and water service in some locations, especially at bridge replacement sites. In addition, an 18" sanitary sewer pipe within the District's existing Stanford Channel right of way would be lowered where it crosses the proposed bypass. Street lights and associated wiring would be relocated where they would interfere with construction of the bypass channel. Storm water drainage would not be affected by the project. The impacts to utilities would be temporary and insignificant.

15. Public and Environmental Health

A small portion of the existing trapezoidal concrete channel will be replaced by vertical wall channels. Because vertical channels are difficult to climb, they present an increased hazard to the public, especially to children, in the event of a fall into the channel. Steel safety ladders are included in the project proposal as mitigation for this safety hazard. Where vertical wall channel sections are constructed, six-foot chain link fence would prevent young children from falling into the channel.

The excavation work in portions of the project area required for construction and renovation may encounter toxic materials in the soil or water. This might cause a health hazard to construction workers or nearby residents. Soil and groundwater along the construction area right of way would be analyzed for hazardous chemical contamination where the potential for this possibility occurs (based on known toxic contamination sites nearby). In the eevent of finding contaminated samples, a contingency plan for the containment or disposal of the hazard would be developed prior to construction, in order to prevent health hazards.

16. Aesthetics

Where construction activities are proposed along the existing concrete lined creek channel downstream of El Camino Real the project has low visibility because it is located behind backyard fences and has few of the attributes of a natural riparian corridor. The primary area of aesthetic concern is along the underground bypass channel within the Stanford Channel area (Bypass Station 2+00 to 15+50), along a bike path (Bypass Station 27+00 to 32+00) and in and adjacent to Bol Park (Diversion Channel Station 0+00 to 22+00).

The construction of the bypass within the Stanford Channel easement would require the clearing of a large number of native and ornamental trees and shrubs, especially a few large Monterey pines. These plantings provide a screen between residential backyards and the Varian property. The trees and shrubs limit views from residences to the Varian buildings, and provide some psychological benefit from noise emanating from the Varian property. Clearing would temporarily open views to the Varian buildings and sound wall on the southeast boundary of the easement. As part of the project, restoration of plantings will be implemented. The largest trees will be allowed to remain by maintaining the excavation zone close to the Varian side to the northwest. No long-term significant impacts would result.

An area of apprroximately one-half acre on the west side of the bike path would be cleared of vegetation due to construction of a temporary bike path. This strip of native and ornamental trees and shrubs provides a buffer between the bike path and residential backyards. In addition, it is part of a green belt corridor viewed by recreationists passing through this linear park. The complete loss of this vegetation would be an adverse short-term aesthetic impact. Mitigation for these impacts would include developing a plan for revegetation of this site and to implement work immediately after construction is completed. A maintenance plan would be developed to assure the establishment of these plantings. Over time, these mitigations would offset the aesthetic impacts.

Temporary aesthetic impacts would occur at the bridge crossing where construction equipment, warning signs, and excavation activity would be highly visible. Because these conditions would be temporary, no significant impact would result.

17. Recreation

Because the bypass and diversion channels propose utilization of a right-of-way presently used for a bicycle path, there is potential for impacts to recreationists who use this path. The existing bicycle paths would be detoured, however, as part of the project; detour paths would be provided so that no disruption to access in these areas would occur. Thus no significant impacts would result.

18. Archeological/Historical

The project is located within an archeologically sensitive area. A professional archeology firm, Archeological Resource Management, performed an archival search of the State records and a surface survey of the right of way subject to disturbance by the project. The cultural resource evaluation report contains recommendations for mitigating potential impacts to archeological resources. These recommendations will be implemented by the District prior or during construction as appropriate. Selected portions of the archeological study are attached.

INTRODUCTION

A biologist evaluated the vegetation and wildlife habitat value for the proposed project. A set of aerial photos (at a scale of 1"=50'), a street map (1"=0.5 mile), binoculars and field identification guides assisted in the analysis. The purpose of this report is to identify native vegetation and wildlife habitat values present at the project site. Animals and plants that were observed were noted. However, a complete inventory of plant and animal species was not attempted. Notes were recorded concerning vegetation within the channel bottom, bank slopes, and the area from the top of bank to the outer edge of the right-of-way. Vegetation adjacent to the creek channel was also noted where it was present. Areas of natural vegetation were classified using the system of California habitat types developed by Cheatham and Haller (1975) which was more recently updated by Holland (1986). Native plant names are as described by Munz and Keck (1973). Horticultural plant species and varieties follow the Sunset New Western Garden Book (1979).

For planning purposes, the study area was subdivided into eleven reaches along Matadero Creek. Additional project areas include the Matadero Bypass and the Barron Creek Diversion Channel. Each reach is discussed in further detail below with respect to vegetation, wildlife, the impacts of the project on biotic resources, and mitigations that would reduce to a level of insignificance or eliminate any noted impacts.

Matadero and Barron Creeks Biological and Visual Resources Impact Assessment

By

Harvey & Stanley Associates, Inc.
Michael Marangio, Environmental Planner

For

SCVWD
5750 Almaden Expressway
San Jose, CA 95118
Attn: Dr. Bernie Goldner, Environmental Specialist

December 3, 1987 File No. 360-01

POTENTIAL SPECIES OF CONCERN

The aquatic habitat of the creek has the potential for utilization by the San Francisco fork-tailed damselfly (Ischnura gemina). This diminutative relative of the dragonfly (both in the insect order Odonata) is classified by the U.S. Fish and Wildlife Service as a candidate for protection under the Federal Endangered Species Act, category 1. This list includes taxa for which there is sufficient biological information to support a proposal to list as endangered or threatened (CDFG 1986). This species is known from scattered locality records to inhabit coastal areas from Santa Cruz County to Marin County. A record from 1949 is known for Sharon's Pond on the nearby Stanford campus (Garrison and Hafernik 1981). Their flight period is from late March to November (Dr. Rosser Garrison, pers. comm.).

Damselflies have an aquatic larval stage known as a nymph or naiad. The brown larva is 1 inch or less in size and probably takes 1 year to mature. They generally are found in algae mats in backwaters of creeks and in ponds. They are known to inhabit both natural creeks and concrete channels. (Dr. Rosser Garrison, pers. comm). Along Reaches 1, 4, 5 and 6, where the aquatic habitat would potentially be impacted by proposed project construction activities, a survey was made for this species. Adults were searched for in emergent vegetation, and larvae were dip-netted for in mats of algae and other vegetation. Little suitable habitat was found. Dipnet samples revealed no larval damselflies. Adult damselflies were observed and collected but were identified as common species. The results of this preliminary damselfly survey revealed a low potential for the utilization of these portions of Matadero Creek by the San Francisco fork-tail damselfly. Thus, impacts to this species are judged to have a low probability of occurring.

EVALUATION OF PROJECT AREA

REACH 1:Matadero Creek - Palo Alto Flood Basin to Bayshore Freeway

(Station 80 + 00 to 93 + 00)

Vegetation. Extending from the Palo Alto Flood Basin to the downstream side of Bayshore Freeway, this 1300-foot section consists of a trapezoidal earth channel approximately 75 feet wide near the south side of East Bayshore Road. This channel contains a thick growth of cattails (*Typha* spp.), bulrush (*Scirpus* sp.), and stinging nettle (*Urtica holosericea*) . Much of the rest of the channel contains a dense growth of willow (*Salix* spp.), with some California walnut (*Juglans hindsi*). An exotic species, giant reed (*Arundo donax*), also grows within the channel. In more open areas, between willow and California walnut grow thickets of introduced Himalaya blackberry (*Rubus procerus*) and Califonia rose (*Rosa californica*). Saltgrass, (*Distichlis spicata*), introduced periwinkle (*Vinca major*) and discarded plant cuttings, tires, and other car parts were seen along the northern banks. The channel and bank vegetation is a disturbed form of Central Coast Riparian Forest (Holland 1986). At the top of the bank grow weedy grasses (*Avena barbata*, *Bromus mollis*) patches of introduced thistle (*Cirsium* sp.) and fennel (*Foeniculum vulgare*). A gravel parking area bare of vegetation lies adjacent to this weedy growth at the top of the bank.

Wildlife. A variety of waterfowl and wading birds would be expected to utilize this reach because of its close proximity to the Palo Alto Baylands Ecological Preserve. A Common Gallinule (*Galinula chloropus*) was observed. Mallard (*Anas platyrhynchus*), Coot (*Fulica americana*), Great-blue Heron (*Ardea herodias*) and Green-backed Heron (*Butorides virescens*) would also be expected. Other birds that utilize the emergent vegetation such as Red-wing Blackbird (*Agelaius phoeniceus*) and Black Phoebe (*Sayornis nigricans*) would also be expected. House Finch (*Carpodacus mexicanus*) and Mourning Dove (*Zenaidura macroura*) were observed in the open areas adjacent to the riparian habitat.

No adult or larval damselflies were observed. Dipnet samples included dragonfly larvae, dytiscid beetles, crayfish, mosquito fish (Gambusia affinis) and stickleback (Gasterosteus aculeatus).

Impacts. The proposed pedestrian access ramp would lead from the gravel parking area across the bank to the creek bottom. This would eliminate an already disturbed area containing discarded car parts and patches of introduced invasive plants. The concrete channel lining adjacent to the bridge would eliminate a small area of dense bulrush and cattails. Because the area is small and close to the Bayshore Freeway, wildlife use of this area is probably low and therefore the impacts of the proposed project would be small. Construction activities would have a temporary impact on wildlife use in the project vicinity but would also be considered of low importance.

REACH 2: Matadero Creek -Bayshore Freeway to Greer Road (Station 93 + 00 to 107 +00)

Vegetation. Reach 2 consists of a 1400 foot long trapezoidal channel about 60 feet wide at the top with sacked-concrete sides and a 40 foot natural bottom. Concrete lines the bank adjacent to the West Bayshore Bridge crossing. Vegetation consists of thick patches of emergent vegetation along the toe of the banks. These plants included cattails, aquatic grasses (Paspalum dilatatum), nut sedge (Cyperus sp.) and wild mustard (Brassica geniculata). Additional plants include spiny clotbur (Xanthium spinosum), cocklebur (Xanthium strumarium), stinging nettle and castor bean (Ricinus communis), invasive non-native species. A strip of emergent vegetation about 20 feet long, consisting primarily of water-loving grasses (Paspalum dilatatum), were observed where sediments collect within the channel near the bridge.

The sacked-concrete channel sides have a neglible growth of exotic grasses growing in cracks. The dirt maintenance roads on both sides of the creek are bare of vegetation. On the outside edges of the maintenance road are plantings of Algerian ivy (Hedera canariensis), oleander (Nerium oleander), Italian buckthorn (Rhamnus alaterna), ice plant (Carpobrotus edulis), and pampas grass (Cortaderia jubata) . A few volunteers of native coyote brush (Baccharis pilularis ssp. consanguinea) and exotic fennel also grow in this area. Plantings at the fences of backyard properties to the west include a variety of ornamental plantings such as California pepper tree (Schinus molle), purple plum (Prunus cerasifera) and glossy privet (Ligustrum lucidum).

Wildlife. The cattails and other thick emergent vegetation in the channel bottom provide cover and nesting habitat for several waterfowl and stream - associated birds. This type of wetland habitat is better developed downstream beyond the Bayshore Freeway. A pair of Pied-billed Grebes (Podilymbus podiceps) was observed in the channel along with two Mallards. In the water, carp (Cyprinus carpio) and mosquito fish were seen near the surface.

The general lack of vegetation along the sacked-concrete banks and maintenance roads provides marginal habitat for wildlife in these areas. However gopher tunnels and observations of Black Phoebe and Mourning Dove indicate some wildlife use of this portion of the site. A number of songbirds would be expected to utilize the adjacent plantings on the right-of-way and in nearby residential backyards. A Brown Towhee (Pipilo fuscus) and a Mockingbird (Mimus polyglottus) were observed. Other expected species include House Finch, House Sparrow (Passer domesticus), Brewer's Blackbird (Euphagus cyanocephalus), and American Robin (Turdus migratorius).

The spaces beneath road crossings provide shelter for wildlife. A dead barn owl (Tito alba) was observed adjacent to Bayshore Freeway during July of 1987 (Keith Whitman, pers. comm.) and whitewash on a ledge below the West Bayshore Road bridge indicates the use of the bridge for bird roosting. Other birds such as Black Phoebe and several swallow species may also utilize these bridges for nesting.

Impacts. The placement of concrete floodwalls at the outer edge of the maintenance roads would not result in any significant loss of vegetation or wildlife habitat. Some plantings at the outer edge of the right-of-way may be removed or pruned to allow for construction of the wall, but these temporary impacts would be insignificant. The construction of a maintenance ramp, and a bench beneath Bayshore Freeway would not affect any vegetation, but could disturb any nesting or roosting birds utilizing these bridges during the spring season. Construction of a concrete channel bottom near the Bayshore Freeway bridges would result in losses of a small amount of emergent vegetation. This is not considered a significant impact. The removal of an abutment and backfilling of a small irregular-shaped portion of the bank will have no biological impacts.

Mitigation. To reduce potential impacts to nesting birds such as swallows and Black Phoebe, construction activities under the bridge should be postponed until nesting is completed if active nests are encountered during spring or early summer. Alternatively, nesting can be discouraged by the placement of chicken wire on the bottom of the culvert.

REACH 3: Matadero Creek - Greer Road to Cowper Street (Station 107 + 00 to 153 +12)

Vegetation. This reach consists of a concrete trapezoidal channel with a channel bottom width of 13-20 feet. Vegetation within the channel consists of mats of algae and occasional patches of watercress (*Rorippa nasturtium-aguaticum*). Nut sedge clumps occasionally are found at the toe of the channel slope. The concrete banks are bare of vegetation, as are the dirt access roads that run adjacent to the channel. Chain-link and wood backyard fences abut the channel right-of-way. Plantings within the backyard borders include bamboo (*Bambusa* sp.), Chinese elm (*Ulmus parvifolia*), pepper tree, purple plum, Monterey pine (*Pinus radiata*), firethorn (*Pyracantha* spp.), bottlebrush (*Callistemon* sp.), glossy privet, eucalyptus (*Eucalyptus* sp.), California walnut, apple (*Malus* sp.), and Italian buckthorn. Occasional volunteer trees and shrubs grow between the residential properties and the concrete bank edge. These include small (less than 6 feet tall) California walnut, Chinese elm, and coyote brush. Vines, especially Algerian ivy, commonly spread into the right-of-way from the backyard landscaping.

Wildlife. Wildlife use of this reach is low. The only wildlife habitat available consists of the backyard plantings that grow adjacent to the creek right-of-way. A number of birds were observed within the residential landscaping. These include House Finch, Scrub Jay (Aphelocoma coerulescens), House Sparrow, Anna's Hummingbird (Calypte anna), Brewer's Blackbird, and Mourning Dove. An active nest of a Barn Swallow was seen beneath Greer Road Bridge. The creek channel itself offers little wildlife habitat value except for the presence of water.

Impacts. The construction of floodwalls and maintenance ramp modification would have no biological impacts. The replacement of the Greer Road Bridge could destroy nests of Barn Swallow.

Mitigation. To reduce impacts to nesting birds beneath Greer Road Bridge, construction activities should be postponed until nesting is completed if active nests are encountered during spring or early summer.

REACH 4: Matadero Creek - Cowper Street to Alma Street
(Station 153 + 12 to 175 +45)

Vegetation. Reach 4 consists of a trapezoidal concrete channel extending about 2,200 feet. Patches of thick algae mats and watercress grow in the channel. No vegetation grows on the channel sides and only a few areas have any plant life growing between the concrete channel sides and the residential backyards adjacent to the creek right-of-way. One such area near the Bryant Street Bridge consisted of a thick growth of giant reed. Adjacent to this site was an area planted with cactus (Opuntia sp.) and trees of apple and juniper. Adjacent backyards contain a wide variety of non-native ornamental trees and shrubs including oleander, firethorn, Cape plumbago (Plumbago auriculata), California pepper tree, walnut, orange, bottlebrush, pomegranate (Punica granatum) and Monterey pine. A large Siberian elm extends out from one backyard to provide a partial canopy over the creek. Passion fruit vines (Passiflora sp.) occasionally grow over fences into the right-of-way.

Wildlife. The channel vegetation provides minimal wildlife habitat. Black Phoebe was observed within the channel. A few other bird species such as House Finch, Mockingbird, and House Sparrow typically associated with the nearby ornamental vegetation would be expected in this area. No dragonflies or damselflies were observed. Dipnetting samples taken between Cowper and Waverly Streets revealed no damselfly larvae. Aquatic organisms observed include amphipods, snails, and mayfly larvae.

Impacts. The placement of flood walls along the channel banks will have no significant impacts to vegetation or wildlife. The proposed widening of the channel between Cowper and Waverly Streets would be unlikely to effect the San Francisco forktail damselfly.

REACH 5: Matadero Creek - Alma Street to Park Boulevard (Station 175 ± 45 to 182 ± 92)

Vegetation. Reach 5 consists of a concrete trapezoidal channel extending 800 feet from the downstream side of Alma Street to the downstream side of Park Boulevard. Within the channel bottom a thick growth of watercress and mats of algae were observed in the slower moving portions of the creek. No vegetation was observed on the channel banks or along the outer edges of the right-of-way except for an occasional seedling pampas grass, tree of heaven (Ailanthus altissima), and coyote brush. Adjacent ornamental plantings include Cape plumbago, oleander, glossy privet and Monterey pine. A grove of pepper trees consisting of 8 trunks ranging from about 10 to 20 inches diameter breast height (dbh) grow adjacent to the old alignment and are on the proposed new alignment. Approximately 20 eucalyptus trees along with several Australian tea shrubs (Leptospermum laevigatum) are located along the Palo Alto electrical substation where the new creek alignment is proposed. The Eucalyptus trees had recently been stubbed back to approximately 15 feet.

Wildlife. The Southern Pacific Railroad (SPRR) overpass provides roosting and nesting areas for introduced Rock Doves (pigeons). The channel provides some habitat for Black Phoebe, and several species of swallow hunt for insects in this area. The adjacent backyard habitats attract House Finch and other species of songbirds typically found in city and suburban surroundings. Adult dragonflies and blue-colored damselflies were observed within the channel. Dipnetting samples revealed snails, crayfish, mayflies, dytiscid beetles, worms, and amphipods. Stickleback and mosquito fish were also observed. No adult or larvae of the San Francisco fork-tail damselfly were observed.

Impacts. Twenty large eucalyptus trees and eight large California pepper trees would be removed as part of the project. The proposed project includes a plan to plant trees within the former creek right-of-way as mitigation for loss of the eucalyptus trees.

Removal of the pepper trees would reduce roosting habitat for birds in the area, a low-level negative impact. The loss of channel vegetation as a result of construction of a new channel alignment would result in minimal impacts to wildlife because of minimal use by animals in this area. The loss of roosting and nesting habitat for pigeons beneath the SPRR bridge is not significant. No impacts to the San Francisco forktail damselfly are likely to result from the proposed project.

Mitigation. The 20 eucalyptus trees and pepper trees to be removed within the old alignment would be replaced with native trees and shrubs. Potential trees include California sycamore (*Platanus racemosa*), white alder (*Alnus rhombifolia*), flowering ash (*Fraxinus velutina* var. *coriacea*), California black walnut (*Juglans hindsii*), Fremont cottonwood (*Populus fremontii*), coast live oak (*Quercus agrifolia*), and valley oak (*Quercus lobata*). Shrubs to consider include various species of deerbrush (*Ceanothus* spp.), toyon (*Heteromeles arbutifolia*), Wax myrtle (*Myrica californica*), holly - leaved cherry (*Prunus ilicifolia*), red-flowering current (*Ribes sanguineum*), and dwarf coyote brush (*Baccharis pilularis*). By providing higher quality habitat for birds through the planting of a variety of native trees, shrubs and groundcovers, the loss of the pepper tree grove would be mitigated along with the loss of the eucalyptus trees.

REACH 6: Matadero Creek Park Boulevard to El Camino Real. (Station 182 + 92 to 199 +90)

Vegetation. This reach of trapazoidal concrete channel extends 1600 feet from the downstream side of Park Boulevard to the downstream side of El Camino Real. The channel bottom is generally sparsely vegetated with mats of algae and watercress. Immediately north of the Lambert Street Bridge, channel vegetation is thick, primarily consisting of watercress but also including nut sedge and rabbits-foot grass (*Polypogon monspeliensis*). Another area about 150 feet north of the El Camino Real bridge containes thick watercress, algae mats, rabbits-foot grass and a strip of cattails 25 feet in length by about 5 feet wide.

The slopes and upper edges of the channel are generally bare except for occasional introduced weeds such as cheeseweed (*Malva* sp.). A variety of trees and shrubs observed on adjacent properties include Monterey pine, Cape plumbago, and glossy privet.

Wildlife. No birds were observed although the areas where a thick growth of cattails and grasses occurs would be expected to attract Brewer's Blackbirds and Black Phoebe, while areas with nearby backyard vegetation would support Mockingbird, House Sparrow, and other city-adapted birds. Western toad (*Bufo boreas*) tadpoles and recently transformed juveniles were observed where there is dense channel vegetation. Young Pacific treefrogs (*Hyla regilla*) were also seen. Adult dragonflies and damselflies were seen flying within the channel. Dipnet samples included no damselfly larvae, but snails, crayfish, leeches, dragonfly larvae, and stickleback were caught.

Impacts. The replacement of the trapezoidal channel with a rectangular channel would result in the loss of channel vegetation, most of which is sparse and of marginal use by wildlife, resulting in minimal wildlife impacts. Because San Francisco fork-tail damselflies were not observed, it is assumed that they are unlikely to be present and thus no impacts to this species would be expected to result from the loss of channel vegetation.

Mitigation. No mitigation is necessary.

REACH 7: Matadero Creek - El Camino Real to Matadero Avenue (Station 199 ± 90 to 212 ± 64)

Vegetation. Much of the vegetation of this reach is native riparian woodland that is similar to that described as Central Coast Live Oak Riparian Forest by Holland (1986). Dominant trees include coast live oak, valley oak, elderberry (*Sambucus mexicana*), dogwood (*Cornus stolonifera*), and poison oak (*Toxicodendron diversiloba*). Introduced species including acacia (*Acacia* sp.) and fennel indicate the somewhat disturbed nature of portions of this reach. Trees create a closed canopy over much of the creek. Creek banks are a combination of natural, rip-rap and sacked concrete. No vegetation was observed within the creek bottom, and little understory vegetation grows beneath the trees.

Wildlife. Wildlife was not observed but a number of bird species would be expected to utilize the protected channel area and the dense tree canopy. For example, Yellow Warbler (*Dendroica petechia*), Warbling Vireo (*Vireo gilvus*), and Northern Oriole (*Ictreus galbula*) would utilize the higher canopy areas for nesting and feeding.

Common Flicker (*Colaptes auratus*) nest and forage in the larger trees, while the Downy Woodpecker (*Dendrocopos pubescens*) use smaller trees. Willow Flycatcher (*Empidonax traillii*), American Goldfinch (*Spinus tristis*), and Song Sparrow (*Melospiza melodia*) utilize the dense shrubs for feeding and nesting. Plain Titmouse, (*Parus inornatus*), Bushtit (*Psaltiparus minimus*), and Chestnut-backed Chickadee (*Parus rufescens*) are commonly found feeding in flocks on insects, especially in coast live oaks. The availability of water and shelter along the creek attracts opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Amphibians such as Pacific treefrog (*Hyla regilla*) and slender salamander (*Batrachoseps attenuatus* find protection in the moist soil along the creek.

Impacts. One area on both upper creek terraces near station 205 + 50 would require a low berm or additional fill to limit flood flows. No impacts would result.

Mitigations. No mitigation is necessary.

REACH 8: Matadero Creek - Matadero Avenue to Laguna Avenue (Station 212 + 64 to 236 60)

Vegetation. Reach 8 is a natural stream channel very similar to that described for Reach 7. Large coast live and valley oak trees dominate this Central Coast Live Oak Riparian Forest.

Wildlife. A variety of wildlife such as described in Reach 7 would be expected to utilize the near-natural riparian habitat conditions.

Impacts. Two small areas along the upper terrace of the creek at approximately station 220 + 50 and 234 + 25 are proposed to have small berms or landfill where these upper banks are near the 1% flow surface elevation. This would not result in significant impacts.

Mitigation. No mitigation is necessary.

REACH 9: Matadero Creek - Laguna Avenue to old SPRR Bridge (Station 236 + 60 to 247 + 00)

Vegetation. This portion of the project, extending 1100 feet from Laguna Avenue to the old SPRR bridge is generally a natural creek with associated Central Coast Live Oak Riparian Forest. It has a 20-25 foot channel bottom that is rocky, and gravelly. Exposed roots along the stream banks indicate increased erosion in recent years. Large trees, primarily coast live oaks provide a dense canopy over the creek. Other trees and shrubs include buckeye (*Aesculus californica*), California bay (*Umbellularia californica*), California walnut, big-leaf maple (*Acer macrophylum*), valley oak, willow, elderberry, toyon, poison oak, Himalaya berry, California blackberry (Rubus ursinus), and snowberry (Symphoricarpas sp.).

Portions of the creek banks have been armored with gunite and sacked concrete. This section of the creek lies adjacent to Bol Park to the south. Plantings of redwood (Sequoia sempervirens), buckbrush, and dwarf coyote brush have been planted in the park adjacent to Matadero Creek.

Wildlife. The well-developed riparian vegetation would be expected to provide habitat for a variety of wildlife species. Black Phoebe utilize the creek bottom, and Brown Towhee were seen along the creek upper banks. Bushtits, Chestnut-backed Chickadee and Plain Titmouse, along with several species of warblers would be expected. Downy Woodpeckers and Common Flicker are also found in the riparian woodland. Mammals such as opossum, raccoon, and striped skunk would also be expected to utilize the riparian corridor for food, shelter and water sources.

In the adjacent residential area to the east and in the park to the west, other species more adapted to human disturbance were observed. These include ground squirrels, House Finch, Scrub Jay, and House Sparrow.

Impacts. It is proposed as part of the project to remove an existing gunite wall just downstream of the old SPRR bridge. The gunite wall would be replaced by gabion structures that would be placed so that the creek slopes can be revegetated with native species. No negative impacts would result.

REACH 10: Matadero Creek - Old SPRR Bridge to Hillview Avenue. (Station 247 + 00 to 275 + 00)

Vegetation. This reach extends 2,800 feet within generally natural Coast Live Oak Riparian Woodland. Much of the creek banks are rip-rapped with concrete slabs or sacked concrete or are bare and eroding. Willows grow in the creek bottom, with buckeye, coast live oak, California bay, California walnut, and elderberry providing a canopy over much of the creek bottom. Understory growth consists of snowberry, poison oak, and escaped exotics including horehound (Marrubium vulgare), Himalaya berry, beavertail cactus (Opuntia sp.), Italian buckthorn, wild oat, fennel and cocklebur. A grove of four large blue gum eucalyptus trees line the creek near "Mickey's pasture".

Wildlife. A variety of wildlife would be expected to utilize this portion of the creek. Opossum and raccoon likely forage within the creek. Black Phoebe, Brown Towhee, Scrub Jay and House Finch would also be expected within the brushy areas and along the habitat edges. Common Flicker and Downy Woodpecker utilize cavities in trees for nests. Willow Flycatcher, American Goldfinch, and Song Sparrow utilize the dense undergrowth while Chestnut-backed Chickadee, Plain Titmouse and Bushtit feed in flocks on insects in the upper canopy.

An access ramp is proposed to link the Veterans Hospital property to the existing stilling basin at Station 265. This ramp would eliminate a number of small coast live oaks along the upper creek terrace within an area of approximately 1200 square feet. In addition, modifications to the stilling basin would eliminate thick growths of willow, blackberry, coast live oak, and poison oak that cover about 1750 square feet. Where the proposed box culvert would enter the stilling basin, a strip of dense riparian vegetation about 15 feet by 90 feet would be removed, eliminating another 1350 square feet of riparian habitat.

Bank protection extending about 50 feet long and 20 feet wide would eliminate about 1000 square feet of dense growth of coast live oak, introduced acacia trees, Himalaya berry, and poison oak.

The dense habitat contains a variety of food sources and shelter that support a variety of wildlife. The loss of riparian woodland for the construction of one access ramp, bank protection, and stilling basin modifications would result in habitat losses for wildlife covering approximately 0.12 acre.

Mitigation.The loss of habitat values is considered minor and no mitigation is proposed.

REACH 11: MATADERO CREEK-HILLVIEW AVENUE TO FOOTHILL EXPRESSWAY (Station 275 ± 00 to 303 ± 55)

Vegetation. This creek reach contains steep stream banks, many of which are eroding. A number of sacked concrete and wooden walls have been constructed where severe erosion problems previously existed. Large coast live oaks and valley oaks grow on the banks and upper terraces. Buckeye and willow also grow associated with the creek. Small backwaters provide opportunities for the growth of cattails and watercress within the creek channel.

Wildlife. The riparian habitat of Reach 11 provides good quality resources for a variety of wildlife. Scrub Jay, Bushtit, Downy Woodpecker and Chestnut-backed Chickadee utilize the oak canopy for food and shelter. Yellow Warbler, Warbling Vireo and Northern Oriole also would utilize this riparian habitat. Raccoon and possibily deer use the creek bottom and banks for shelter. Pacific treefrog, slender salamander, and possibly California newt (*Taricha torosa*) find suitable moisture conditions here. The following descriptions give details of vegetation at specific sites proposed for modification. Specific impacts and mitigations for these sites follow.

Proposed ramp - Stanford property (Station 277 ± 50): Vegetation consists of one coast live oak about 5 feet tall. A mixture of introduced annual grasses covers the slope, with scattered coyote brush, poison oak, and fennel. A portion of the lower slope is eroded and bare, with exposed tree roots.

Impacts. Cut slopes required for ramp construction would result in bare slopes that could result in soil erosion, creek sedimentation, and water quality deterioration.

Mitigation. Appropriate soil erosion control measures would be utilized to prevent soil loss on cut slopes.

Proposed Stepped Gabions (Station 280 ± 50): This site lies below an undermined tennis court. A patch of Himalaya berry, a small California walnut tree (less than 6' tall) and a few scattered shrubs of coyote brush are associated with a failed sacked concrete and a retaining wall made of telephone poles.

Impacts. No significant impacts would result.

Proposed Channel Widening (Station 281 ± 00). A narrow portion at the base of a small footbridge contains a sacked concrete wall and an eroding bank of weedy grasses, fennel, Fuller's teasel (*Dipsacus sativus*), and a few young willows at the creek edge.

Impacts. No significant impacts would result.

Proposed Ramp, Stanford property (Station 283 ± 00). The creek bank is grassy here with buckeyes on the bank. Two planted Aleppo pines (*Pinus halapensis*) and a medium-sized coast redwood would probably be removed because damage to their root systems would result from excavation for the ramp.

Impacts. The proposed ramp would eliminate three large ornamental trees that provide roosting and nesting habitat for birds in the area. This impact is considered insignificant in view of the amount of adjacent vegetations, and no mitigation is proposed.

Proposed Widening and Slope Protection (Station 285 ± 50). This narrow steep portion of the creek is eroding. Two pruned buckeye trees are present along with introduced thistle, honeysuckle (*Lonicera* sp.), and Algerian ivy.

Impacts. Removal of this vegetation is considered a minor impact.

Proposed Channel Widening (Station 292 ± 00). This sharp turn in the creek alignment is mostly bare of vegetation because the substrate is steep-sided sandstone. Buckeye trees on the upper terrace of the south side of the creek are being undercut, exposing many roots of these trees. These trees would be removed for widening. Valley oaks nearby would remain.

Impacts. Channel widening would result in the removal of a small grove of buckeye trees which would eventually be lost as erosion continues.

Proposed Gabion Bank Protection (Station 293 ± 00). Two large coast live oaks (one with a double trunk of 14 and 20 inches, and the other with a trunk of 36 inches diameter breast height (dbh)) grow on the vertical banks proposed for creek erosion protection on the north side. A few small willows grow at the creek edge.

Impacts. The bank will be stabilized so as to preserve the two oaks.

Proposed Gabion Bank Protection (Station 297 ± 00). This portion of the creek is a steep bank covered with introduced grasses and weeds. Two large coast live oak trees growing on the bank downstream are being undermined.

Impacts. Appropriate bank protection would be used to protect both the banks and trees.

REACH 7B: MATADERO CREEK BYPASS - STANFORD CHANNEL RIGHT OF WAY (Station 0+00 to 15+50)

Vegetation. The proposed bypass would be an underground 12-foot high by 12-foot wide concrete box culvert. It would be constructed after removal of an existing 84-inch diameter underground concrete pipe and an open concrete-lined channel.

The open trapezoidal concrete channel has very little vegetation growing in the bottom. However, there is a great deal of planted and volunteer shrubs and trees growing on and adjacent to a low berm above the existing underground concrete pipe.

A large number of mature (40 feet high) Monterey pine, along with occasional Italian poplar (Populus nigra italica), eucalyptus, and acacia trees provide a high and dense canopy, providing wildlife habitat and screening between a residential and industrial area. Many dense plantings of Chinese photinia (Photinia serrulata), oleander, and toyon are located within the construction zone. Scattered within these plantings are Brazilian pepper (Schinus terebinthifolius), California pepper, tree-of-heaven, firethorn, and apple, cherry, and apricot trees (Prunus spp.). Many young coast live oaks (mostly 5-12 feet tall, with several 25 feet tall) are scattered throughout the construction area.

Wildlife. Habitat requirements are provided in this reach for a variety of wildlife that are adapted to urban environments. Open water at the northern end of this portion of the project provides water for songbirds such as Black Phoebe, and Mourning Dove. The dense vegetation and combination of tall canopy and shrubby undergrowth provides habitat for gray squirrel (Sciurus griseus), Scrub Jay, House Finch, House Sparrow, Brown Towhee, and Anna's Hummingbird. The presence of young oaks increases the habitat value of this area because acorns are a food source that are utilized by a wide range of wildlife.

Impacts. Excavation for removal and replacement of the existing concrete underground channel would require removal of about 90 trees and 135 ornamental shrubs. This would result in a temporary negative impact to wildlife because their food and shelter requirements would be eliminated.

Mitigation. The box culvert alignment follows the northwest side of the 50-foot wide easement. This alignment would retain all but about eight of the large Monterey pines. In addition, the trench for the culvert will be vertically cut with shoring to limit the width of the construction zone which will reduce the amount of vegetation that would be removed by the project. A professional landscape architect will be retained by the District to design a landscape plan to restore the disturbed area. Emphasis will be placed on planting fast growing California native and ornamental drought-tolerant trees and shrubs on an earth berm placed over the box culvert. Consideration will be given to planting a number of specimen size trees to provide a quick screening effect. The landscape plan will be prepared during the design phase of the flood control project. The district will be responsible for maintaining the plants until they are established.

REACH 7B: - MATADERO CREEK BYPASS -VARIAN PARKING LOT
(Station 15 + 50 to 32 + 00)

Vegetation. The proposed 1100-foot alignment would result in construction of an underground concrete culvert 12 feet high by 12 feet wide beneath southern edge of the Varian parking lot. No vegetation is found there.

Wildlife. No wildlife habitat is located on this portion of the project.

REACH 8B - MATADERO CREEK BYPASS - SPRR RIGHT OF WAY
(Station 27 + 00 to 32 + 00)

Vegetation. This portion of the project is 80 feet wide and about 500 feet long. A bicycle path is located in the center of this linear park. A variety of planted and volunteer native and introduced trees and shrubs grow on both sides of the path. The east side of the path contains mostly mature coast live oak trees that provide high habitat value for wildlife. On the west side of the path grow a mixture of coast live oak, California pepper trees, valley oak, cotoneaster (Cotoneaster lacteus), acacia, olive, almond trees, pine trees, and California bay.

Wildlife. A variety of songbirds would be expected in this area. Bushtits and Chestnut-backed Chickadees utilize the food and shelter provided by the oak trees. Scrub Jay, House Finch, Brown Towhee, and Anna's Hummingbird also use this habitat.

Impacts. The combination of excavation of the bike path for construction of the underground bypass and the proposed construction of the temporary bike path along the western side of the right of way would result in the almost complete removal of the vegetation along the west side of the right of way, an area of approximately 20,000 square feet. Approximately 30 trees and 18 shrubs would be removed. This would result in a moderate to severe localized loss of wildlife habitat because of the removal of valuable oaks that provide important habitat values for wildlife. Houses located along the western side of the path would lose their privacy due to the loss of the vegetation which screens the homes from the bike path traffic.

Mitigations. As discussed above, a landscape architect will develop and the District will implement a landscape plan to replace the visual and wildlife values of the existing vegetation. Even with large size trees, it will take several years before as much screening as now exists is restored.

REACH 9B: - MATADERO CREEK BYPASS -BOL PARK ALIGNMENT (Station 32 + 00 to 45 + 00)

Vegetation. The underground culvert would generally be located beneath an existing bicycle path through Bol Park. Most of the construction alignment is an asphalt pathway with bare soil or grass adjacent. Approximately 2 eucalyptus trees and 3 Monterey pines would be removed or damaged by the construction along the bicycle trail. In addition, two coast live oaks 7-10 feet tall would be eliminated where the bypass connects with Matadero Creek upstream of the SPRR bridge. Patches of yellow star thistle (*Centaurea solstitialis*) grow nearby on disturbed sites.

Wildlife. Ground squirrels inhabit burrows in nearby areas. Songbirds adapted to park settings such as Robin, House Finch, Scrub Jay, and Mockingbird are found in the park in the area of the bicycle trail.

Impacts. The loss of wildlife habitat would be minimal. Some trees would be removed that provide variety to the park habitat. Soil disturbance could promote the spread of invasive weeds.

Mitigations. Areas disturbed by excavation should be replanted with appropriate groundcover seed mixes to reduce the potential spread of invasive weeds such as yellow star thistle.

BARRON DIVERSION CHANNEL - SPRR Bridge TO Barron Creek Sediment Basin (Station 0 + 00 to 24 +00)

Vegetation. The Barron Diversion Channel would follow the alignment of a bicycle path east of the Veterans Hospital. The adjacent vegetation consists of weedy grasses, patches of yellow star thistle, and occasional trees and brush. Along the trail, approximately 3 12-foot-tall valley oaks would be eliminated along with several shrubs of planted firethorn and native coyote brush.

A small valley oak and a patch of coyote brush would be removed where the diversion connects with the existing sedimentation basin. The sedimentation basin appears to retain water through much of the year (small puddles were evident in August 1987). The basin supports a dense growth of cattails.

Wildlife. The open grassy and brushy areas adjacent to the bicycle pathway support a variety of wildlife including ground squirrel, Bushtit, Chestnut-backed Chickadee, Mockingbird, Rufous-sided Towhee, Lesser Goldfinch, Mourning Dove, and Scrub Jay. Amphibians such as Pacific treefrog and bullfrog are potential inhabitants of the sedimentation pond.

Impacts. There would be a minor loss of wildlife habitat. No mitigation is necessary.

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DRAFT

TRAFFIC IMPACT ANALYSIS

ADOBE AND MATADERO CREEKS
CHANNEL IMPROVEMENT PROJECTS
PALO ALTO

Prepared for
Santa Clara Valley Water District

Prepared by
CH2M HILL
2107 N. First Street, Suite 350
San Jose, CA 95131
(408) 436-4909

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Section 1
INTRODUCTION AND RECOMMENDATION

INTRODUCTION

Santa Clara Valley Water District (SCVWD) is undergoing channel improvement projects along Adobe and Matadero Creeks in Palo Alto. Channel improvement work at bridges may affect traffic operation on the streets overcrossing the creeks. SCVWD has retained three design consultants for three segment designs along the creeks. Construction of these three segments will be awarded to three different contractors. Each segment may have a different construction schedule. For the traffic impact analysis purposes, bridges along these three segments have been grouped in the following manner for project evaluation (see Figure 1-1):

- Bridges on Greer Road, Louis Road, Ross Road, and Middlefield Road at Matadero Creek (scheduled to start construction in summer 1988)
- Bridges on Alma Street at Matadero and Adobe Creeks (scheduled to start construction in 1989)
- Bridges on Middlefield and Charleston Roads at Adobe Creek (scheduled to start construction in summer 1988)

Potential traffic impacts resulting from the channel improvements at these bridges were first evaluated as three separate projects as in the above grouping. The three projects were then evaluated jointly for possible simultaneous construction impacts.

Additionally, SCVWD is planning on construction work for bridges over Matadero Creek at Cowper and Waverly Streets in 1989, and at Park Boulevard and Lambert Avenue in 1990. Existing traffic conditions were also evaluated at these bridges.

A project area bounded by the Oregon Expressway to the north, U.S. 101 to the east, San Antonio Road to the south, and El Camino Real to the west was selected by the City of Palo Alto for traffic impact analysis. The purpose of this study is therefore to:

- Summarize the existing traffic and transportation condition in the study area
- Provide basic guidelines for traffic operation requirements at each project location as input for the design consultants' selection of alternative construction methods

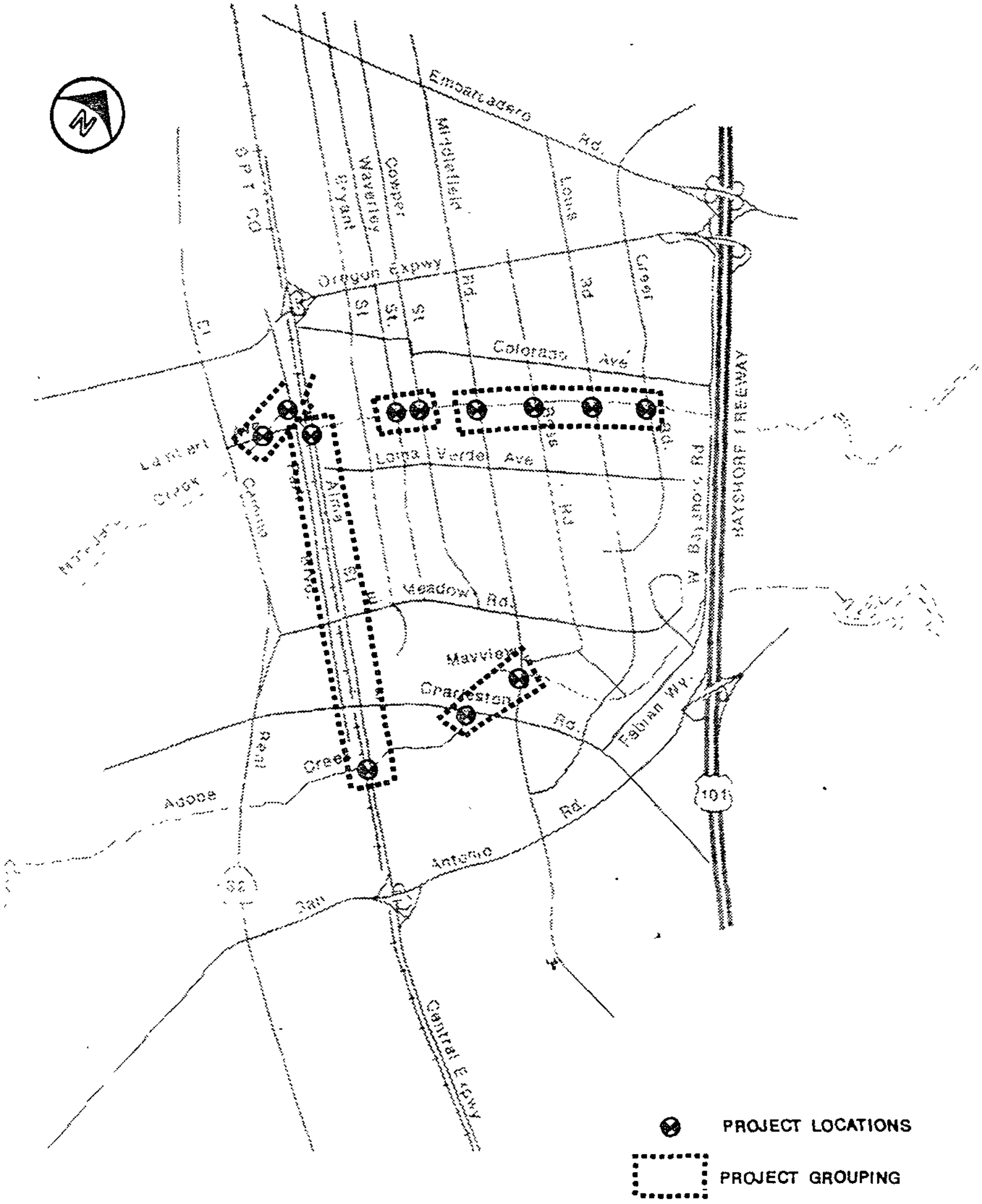

FIGURE 1-1
PROJECT LOCATIONS

CH2M HILL

- Analyze the cumulative traffic impacts for alternative construction methods at project sites

STUDY APPROACH

Existing traffic counts were first collected during the active school period to determine the capacities in terms of number of lanes required at project locations. Additionally, the existing transit, bicycle, and pedestrian activities in the vicinity of project sites were evaluated. Roadway operational requirements at the project sites were recommended from the comparison of traffic volumes with capacities standpoint. The following factors along with the preliminary traffic operational recommendations, were considered jointly by SCVWD, City of Palo Alto, and the design consultants when evaluating construction methods at the bridges:

- On-street parking
- Signing distances
- Pedestrian
- Buses
- Bicycles
- Type of Vehicles
- Cost of construction
- Time of construction
- Widening of the existing right-of-ways
- Trees, lawns, and immediate residents
- Liability
- Emergency Access
- Impact on other streets or intersections
- School commute
- Postal service
- Sanitation services
- Street sweeping

- Public response
- Complaints from other streets
- Impacts on the disabled

Based on the evaluation of the above factors, two alternatives, with combinations of various construction methods resulting in various traffic operational plans at project locations, were selected for cumulative traffic impact analysis.

CUMULATIVE IMPACT ANALYSIS SUMMARY

The following three elements of the cumulative traffic impact were analyzed:

- Traffic diversion
- Intersections levels of service
- Travel delay and backup queue

The analysis results are summarized as follows:

- Closure of one of the Matadero bridges at Greer, Louis, and Ross Road at any one time will not significantly impact the adjacent streets and intersections.

- Closure of one lane in each direction on Charleston Road at Adobe Creek will not significantly affect the travel pattern and impact the adjacent intersections and streets.

- Closure of one lane in each direction on Middlefield Road at Matadero Creek will divert some southbound traffic to adjacent Cowper Street and Ross Road. However, it would not result in significant impacts on the adjacent streets and intersections. An average of 75 seconds travel delay was projected for southbound travel at this location as a result of merging from two lanes to one lane. No significant delay will occur in the northbound direction.

- Closure of one lane in each direction on Middlefield Road at Adobe Creek will divert the excessive traffic in both directions onto Ross Road. However, it will not result in significant impacts on adjacent streets and intersections. An average of 30 seconds delay can be expected for southbound traffic merging from two to one lane. No significant delay will occur in the northbound direction.

RECOMMENDATION

Evaluation of the construction methods for the Matadero bridges at Ross, Greer, and Louis Roads involved consideration of street closures at the bridges. An outreach program was organized by SCVWD. As a result, questionnaires were mailed out to the residents adjacent to the project sites prior to a public workshop. Public responses were generally in favor of the closure of Ross, Greer, and Louis Roads. The following summarizes the final recommendations for the City's approval:

- Consider closure of any one of the Matadero bridges at Greer, Louis, and Ross Roads. No two bridges should be closed at the same time.
- Close one lane in each direction of travel on the Middlefield bridge at Matadero Creek allowing one-lane operation in each direction.
- Stagger the construction schedules for Ross Road and Middlefield Road.
- Close one lane in each direction of travel on Charleston bridge at Adobe Creek allowing one-lane operation in each direction.
- Close one lane in each direction on Middlefield Road at Adobe Creek allowing one-lane operation in each direction.
- Stagger the construction schedules for Charleston and Middlefield bridges at Adobe Creek.
- Retain two-lane operation for each direction of travel on Alma bridges at both the Matadero and Adobe Creeks.

CULTURAL RESOURCE EVALUATION

APPENDIX O

(ADDENDUM)

COMMENTS AND RESPONSES:
MATADERO AND BARRON CREEKS PLANNING STUDY
ENGINEERS REPORT AND FINAL NEGATIVE DECLARATION
SCH #87122908

INTRODUCTION

On January 20, 1988, a Public Hearing was held on the Engineer's Report for the proposed flood control project on Matadero and Barron Creeks, Palo Alto Flood Basin to Foothill Expressway. The purpose of the Hearing was to receive comments from all interested parties regarding the proposed project.

Comments received at the hearing indicated:

1. General support for the project and a need to solve a serious flood problem.
2. Concern with regard to construction related noise and dust.
3. Desire to minimize impacts to vegetation and fully mitigate the unavoidable impacts.
4. Site specific concerns at various locations along the project.

Of the 7,800 notices of Public Hearing and availability of the draft report that were distributed, 26 letters of comment were received. This Addendum contains copies of all letters received, a summary or excerpt of each substantive comment and the corresponding response by the District. The first part of this Addendum includes comments and responses that have been grouped into federal, state, and local agencies, and private organizations and individual citizens. The second part of the Addendum includes copies of all letters of comment received.

The addendum consists first of generalized comments and responses, followed by responses to specific written comments received during the public review period.

COMMENTS RECEIVED

Written Comments Received

1. Federal Agencies

   Veterans Administration

2. State Agencies

   Office of Planning and Research

   * Department of Fish and Game

3. Local Agencies

   * City of Palo Alto

   * County of Santa Clara

4. Private Organizations and Individuals

   * Stanford University

   * Varian Associates

   * Watkins-Johnson Company

   * Barron Park Association

   * Joyce Karst

   * Allen Coleman

   * Herbert Foster

   * John Byrne

   George and Eileen Falkenthal

   * Doug Hohbach

   * Knute Kresie

   * Merry Free Osborn

   * Ansgar and Jane Movik

   * Allan Brown

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* Comments responded to in the Addendum

	Yes	Maybe	No
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X

* Jennifer Raymond
* El Camino Center
* Robert and Helen England
* Donald Frieberg
* Sheila Dunec

Patricia Steck

Robert O'Connor

RESPONSES TO GENERALIZED COMMENTS

General Comment 1:

There are several known groundwater contamination sites within the project area. What precautions and sampling programs will be applied to avoid worsening the contamination or spreading the problems? What contingency plan measures are proposed to deal with problems, if found, and what applicable laws must be followed?

Response:

Appendix L of the Engineer's Report has been expanded to provide a more comprehensive discussion of these issues. A management plan has been developed to specifically address: (1) the pre-construction groundwater and soil sampling; (2) worker and community protection and monitoring measures to be taken during construction, and (3) a contingency plan to deal with substances not identified or discovered during the pre-construction testing program but encountered during construction that require special handling. Please refer to Appendix L.

General Comment 2:

What will be the impact on flooding and peak flow rates in the creeks if additional land development occurs in the upper Matadero Creek watershed? Stanford University and the Stanford Industrial Park have plans to build new facilities that may change runoff characteristics.

Response:

Any proposed development must address potential impacts such as changes in the quality or quantity of runoff, changes in existing floodplains, loss of seasonal wetlands, etc. under the California Environmental Quality Act (CEQA). These issues must be adequately discussed in an environmental document that will be reviewed by this District, as well many other agencies and the general public. Potential impacts to flooding must be mitigated by Stanford or other developers.

The proposed flood control project has been designed to safely carry all flows from the land uses anticipated in the General Plans of Stanford, Santa Clara County and the City of Palo Alto in effect as of 1977. Development of lands over and above the 1977 level must fully address the potential effects on runoff and flooding characteristics including mitigation if it is needed.

General Comment 3:

The proposed project has the potential to impact existing vegetation in several areas. It is encouraged to minimize, to every extent possible, the amount of vegetation removed and fully mitigate the unavoidable losses. Revegetation should be undertaken as quickly as possible following completion of the construction, preferably the same year.

Response:

District policy is to mitigate unavoidable impacts resulting from the project but not to enhance the environment beyond that necessary for mitigation. The District will attempt to revegetate within the same year of construction, however, revegetation is normally constrained by (1) the completion of the construction project; (2) preparation of the plans, specifications, and bid awarding, and (3) the planting season. The revegetation will be installed when it has the greatest chance of success and survival which for California native plants is fall and early winter and is contingent upon when construction is completed to avoid conflicts on the site. Standard District practice is to require the landscape contractor to assume maintenance responsibility for at least two years. Following that, the District will assume responsibility for maintenance of plants and the irrigation systems.

General Comment 4:

The open channel downstream of El Camino Real is adjacent to Boulware Park and is a potential safety hazard to children. Can the channel be covered to eliminate access and make it safer?

Response:

Constructing the proposed channel as an underground or covered box culvert has many disadvantages and probably would not completely eliminate potential access. We estimate it would cost $200,000 to $250,000 additional to design and construct the channel as a box culvert rather than an open U-frame channel. Enclosing the channel would eliminate an important maintenance access ramp proposed upstream of Lambert Avenue and preclude visual inspection of the channel and outfalls. The impaired vertical clearance of the culvert would also limit the type of maintenance equipment that could be used. This is an important concern because this reach of channel is immediately downstream of the natural creek and we anticipate moderate sediment and debris deposition to occur. In conclusion, the disadvantages of additional costs and difficult maintenance do not justify covering this portion of the proposed channel.

There will be a fence to keep children out of the channel and there will be ladders on the channel walls for emergencies.

RESPONSES TO SPECIFIC WRITTEN COMMENTS

State Agencies

Department of Fish and Game

Comment 1: Reach 5, Matadero Creek - Alma Street to Park Blvd. Linear feet of vegetation removed along existing channel at Alma Street should be replaced with native vegetation adjacent to the new channel.

Response 1: The grove of California Pepper trees that would be removed cover approximately 80 linear feet along Matadero Creek near the Southern Pacific Railroad right of way. To compensate for the loss of these pepper trees and the eucalyptus trees, an 80-foot row of trees would be planted along the new channel alignment. Native trees from those listed in appendix page N-30 would be used. Previously owned right of way would be utilized for this use.

Comment 2: To provide for sufficient scouring flows in the natural channel, which will prevent long-term aggradation of sediments, we recommend the bypass channel inlet be designed to divert flows above 1,300 cfs only. In addition, the bypass channel should be designed to eliminate stranding of fish when the flow drops.

Response 2: The flow velocities in the natural creek will not be significantly changed as a result of the proposed bypass channel design. At a 10-year flood the reduction will be less than one foot per second. This reach of creek has been degrading for years. We believe there will be no change in the scour or sediment transport in the future as a result of the project and that the periodic high flows will continue to provide scouring velocities.

Department of Fish and Game

Flows up to about 350 cfs will continue to be carried entirely by the natural creek and no water will enter the bypass channel.

Comment 3: Woody debris and undercutting of the gunite bank have formed a series of pool habitats in the stream channel. This instream habitat should be replaced on a 1:1 basis.

Response 3: Pool habitats would be replaced on a 1:1 basis through the use of log V weirs or similar design as approved by the Department of Fish and Game.

Comment 4: We concur that revegetation with native plant species should be incorporated into the gabion bank stabilization design. In addition, we recommend that riparian trees be planted at the top of the bank to provide shading in the stream channel presently provided for by the undercut gunite bank.

Response 4: The top of bank is presently heavily vegetated with large oaks that provide shading. The purpose of the gabion lining is to stabilize the bank and preserve the trees. These oaks will not be affected by reconstruction of the lower bank and, therefore, there is no need to plant additional trees.

Comment 5: In Reaches 8 and 9 numerous sacked concrete dams have been placed in the channel by the Water District. They are barriers to fish migration at low and moderate flows and should be removed. This may be accomplished as part of the proposed project.

Response 5: This feature has been incorporated into the plans.

Comment 6: The existing bike and pedestrian bridge over Matadero Creek will be replaced and the stream channel will be lined with concrete. We recommend that baffles and a low flow channel invert or grouted rock be placed in the stream channel to prevent creating a velocity barrier to fish migration.

Response 6: The existing bridge is only ten feet wide and presently is a velocity barrier, as well as a hydraulic constriction. The proposed bridge will be widened to 25 feet as shown on plan Sheet 21. Consequently, flow velocities during a one percent flood will be reduced from 17 fps under existing conditions to less than ten fps under proposed conditions. Velocities will be even less during low flow conditions. We have also added a low flow fish channel.

Comment 7: We recommend that proposed gabion stabilization for existing erosion areas described in the Draft Negative Declaration be re-evaluated. Stabilizing the toe of the bank and planting native riparian trees and shrubs on the upper portion will provide stabilization and not eliminate wildlife habitat. If this is not acceptable, we recommend that the gabions be topped with soil and native shrubs be planted.

Response 7: Many of the subject areas have experienced severe erosion at the toe of the bank. The result is a near vertical bank with little vegetation remaining except at the top of bank. If erosion repair is not undertaken more vegetation will be lost.

Gabion protection at the toe will more effectively resist erosion and allow construction of a steeper slope of the bank. We plan to incorporate some planting wells into the gabions, as well as add soil to encourage revegetation.

Comment 8: The proposed access roads will eliminate vegetation adjacent to the stream channel and will result in breaks in the riparian corridor. The linear feet of vegetation removed should be replaced on a 1:1 basis

Department of Fish and Game

with native riparian tree species, either along proposed gabion banks or in areas along Matadero Creek presently devoid of vegetation.

Response 8: The locations of the maintenance access ramps were chosen to provide for maintenance access needs while minimizing impacts to vegetation. Any impacts which do not occur will be mitigated. The loss of significant vegetation will be avoided.

Local Agencies

City of Palo Alto

Comment 1: The project contractor will be required to post a bond in an amount to be determined by the Public Works Department for protection of City streets, sidewalks and similar facilities in the area of the project. Additionally, special insurance or bonding will be required for work near the high-voltage cable lying adjacent to the Matadero Channel. This bond or insurance shall be in a form and amount which is acceptable to the City's Risk Manager.

Response 1: As a condition of the construction contract documents, the project contractor will be informed of the requirement to post a bond. The District will require a minimum of $5 million in property damage insurance.

Comment 2: Special inspection will be required for work in the proximity of the high-voltage line referred to in No. 2. This inspection will be provided by the City at the contractor's expense.

Response 2: In the construction contract documents, the project contractor will be informed of the requirements to pay for the City's inspection fees which will be a condition of the City's street opening permit.

Comment 3: As noted in Item No. 15 of the Barron Park Association's letter to you of January 19, 1988, vegetation should be replaced in kind or better wherever appropriate. This replacement should take place in the same year as construction wherever possible.

Response 3: Please see response to General Comment 3.

Comment 4: Page 59: The Water District plans to build an eight-foot wide bench and ramps on the north bank under the Highway 101 bridge for a future pedestrain pathway. The CALTRANS Design Standards for two-way bike paths require that a minimum of eight feet of horizontal clearance be provided between railings on Class I two-way bike paths. We recommend therefore that the width of the bench be increased to nine feet wide or greater so that, if a railing is installed for a future pathway, the undercrossings horizontal clearance would be acceptable. The Water District should indicate the required distance from the edge of ledge to the footings for the railing (based on its standard for other similar installations) and adjust the width of the ledge accordingly.

Response 4: The width of the proposed bench has been changed to 9.0 feet.

Comment 5: Page 63: The SCVWD indicates that the roadway profile at the Greer Road bridge will not be "significantly" changed but that curbs and gutters will be raised by one foot. The SCVWD should ensure that the proposed modifications to the curb and gutter do not have a negative impact on sight distance. This comment is applicable to all situations where changes in existing road grades are proposed.

Response 5: Comment noted. The City's sight distance requirements are a design constraint.

Comment 6: Page 76: The proposed road grade raising of Park Boulevard must conform to CALTRANS design criteria as well as City of Palo Alto requirements.

Response 6: Comment noted.

Comment 7: Page 84: The construction of the bypass channel will result in the temporary loss of 150 parking spaces in the Varian parking lot. The SCVWD should detail how this loss of parking spaces will be mitigated and what the impact will be on surrounding public streets.

City of Palo Alto

Response 7: At present the Varian parking lot is not fully utilized and the temporary loss of 150 spaces could probably be accommodated by using adjacent parking spaces. If the employment level at Varian significantly increases within the three years that the construction is anticipated and all parking spaces are utilized, a mitigation plan will be put into place. Options to mitigate the parking impact include:

1. Limiting the construction within the parking lot to a two-stage process so that only about 75 spaces would be affected at a given time;
2. Restriping adjacent parking areas to maximize the number of actual spaces;
3. Providing a temporary parking lot in vacant lands within the Varian leasehold, and
4. Working cooperatively with Varian to encourage car pooling, public transportation, etc.

Comment 8: Page 86: Due to the environmental impact (loss of vegetation) related to the construction of a temporary bike path detour within the Southern Pacific Railroad right of way along Reach 8B, the SCVWD should further explore all other reasonable and convenient alternative detour plans including acquisition of a temporary easement from adjacent private properties to construct a parallel bike path detour that would connect to the section of the Varian path which connects to Hanover Street. The traffic along this Reach 8B is in excess of 400 bikes/pedestrians per day; of these users over 100 are elementary through high school age students. Closure of the path, given these traffic counts, is not acceptable.

City of Palo Alto

Response 8: The District did reevaluate alternate routes for the construction of a temporary bike path to be used during the bypass construction. No feasible solutions have been found.

Comment 9: Page 92: The proposed detour bike path alignment across Gunn High property between the City bike path and school path is not mentioned. Further, the existing Gunn High path must be upgraded to minimum standards for two-way bike paths.

Response 9: Details of the bike path detour route, including the proposed alignment are described in Appendix K.

Comment 10: Page N-41: The report indicates that "approximately 30 trees and 185 shrubs" would be removed from Reach 8B due to the combination of excavation/construction of the underground bypass and construction of the temporary bike path. The report should indicate what loss of vegetation is attributable to the bypass project alone and what is attributable to the temporary bike path.

Response 10: A typographical error on page N-41 has been corrected to read "approximately 30 trees and 18 shrubs would be removed." About 16 trees and 12 shrubs would be removed as a result of the bypass construction; an additional 14 trees and 6 shrubs would be removed for the placement of a temporary bike path.

Private Organizations and Individuals

Stanford University (Letter of 1-21-88)

Comment 1: We are concerned that the potential for encountering contaminated groundwater or soils in the construction zone is serious enough to warrant a more detailed treatment of the "contingency plan" section of Appendix L. As mentioned in the "Data" section on page L-2, the document states that "special measures may be required"; these measures can be at least roughly outlined with the assistance of the appropriate agencies (e.g., State Department of Health Services and Regional Water Quality Control Board). We would like the document to specifically address the following: (1) the procedures which would be required by these agencies should contaminated soil or groundwater be encountered; (2) the procedures which would be followed to avoid or remedy the migration of nearby contaminated plumes, should groundwater pumping result in such a migration; (3) the types of permits, if any (e.g., NPDES), which would be necessary for disposing of contaminated materials; (4) the related time delays which could result from any of the above; and (5) the scope of pre-excavation soil and groundwater testing is contemplated. The legal and economic aspects are critical to the project (i.e., who will be responsible for the discharge or disposal of any contaminated materials) as they can significantly impede the progress of this project. We believe these aspects should be addressed in more detail at this stage to avoid or minimize future delays.

Response 1: See response to General Comment 1, responses to your letter of 2-23-88 in the following pages, and Appendix L of Engineers Report.

Stanford University (Letter of 1-21-88)

Comment 2: Stanford's archeologist, Barb Bocek, has communicated with the District archeologist on some of our concerns. We will require continuous monitoring by our archeologist or her designated representative in all areas of excavation deemed to warrant such attention. Sporadic monitoring may be required in less sensitive areas. Generally speaking the closer to a creek bank, the more sensitive the area. Monitoring charges will be payable by the District and are in the range of $8-10 per hour for the "designated representative"; there is no charge for the archeologist's time. The monitor has the power to stop the excavation to investigate possible finds and to remove and preserve same. Any artifacts discovered remain the property of Stanford.

As indicated in the Cultural Resource Evaluation Section, the District will provide monitoring where appropriate under the direction of consulting archeologist Dr. Robert Cartier.

Response 2: The District will make arrangements for coordination of archeological monitoring with Stanford's archeologist.

Comment 3: We seek clarification that the District will be solely responsible for flood control and erosion maintenance in this area (Hillview Avenue to Foothill Expressway) after the granting of the requested easements.

Response 3: The District will be responsible for maintenance of flood control capacity and erosion repair work in this reach after acceptance of easements. Because some of the existing erosion problems in this reach have been caused or aggravated by poor quality or illegal construction practices of the recent past by others, the District may request financial assistance in solving such problems. This would be negotiated as part of the overall agreement.

Stanford University (Letter of 1-21-88)

Comment 4:	We request that the District undertake to specifically notify Stanford lessees who will need to co-sign the subject easements for this project. Those lessees will need to fully understand the nature, scope, and significance of this project and the District needs to bear this burden. Initial review indicates that the following lessees are included in the category: Varian, Watkins-Johnson, Syntex, Harry Fair, Foothills Tennis and Swimming Club, University Club, Matadero Creek Properties, Coherent, and HIACO.
Response 4:	We will be contacting these lessees; this is a routine part of our project planning, design, and construction process.
Comment 5:	Concerning the issue of Stanford requiring consideration for the subject easement grants, our policy is to charge the grantee a reasonable sum. We are assessing this policy with regard to this project.
Response 5:	The District will look at consideration for easements in terms of the overall agreement between Stanford and the District. This overall agreement will evaluate the easement acquisitions, potential toxic substance handling of related soil or groundwater contamination, and the solution of flooding and erosion problems and acceptance of long-term maintenance responsibility.
Comment 6:	Stanford is considering the requested detour of the Matadero Bypass channel into the Varian parking lot. We are aware that Varian basically approves of this alternative. All appearances indicate that we too will approve this parking lot section which is an accommodation to the neighboring Barron Park Association's request.
Response 6:	The District appreciates Stanford's cooperation in this and other aspects of the project.

Stanford University (Letter of 2-23-88)

Comment 1: What procedures would be required by the State Department of Health Services and the Regional Water Quality Control Board if contaminated groundwater or soils are encountered during construction?

Response 1: The State DOHS will require the preparation of a Site Health and Safety Plan (SHSP). An outline of the SHSP is provided in Appendix L. Because the construction will not be creating a permanent discharge and will not significantly worsen the existing contamination, we are advised that an NPDES (discharge) permit under provisions of the Clean Water Act, will not be required from the State RWQCB. Both of these agencies will be contacted during design phase.

Comment 2: If dewatering of excavations during construction is necessary and if such pumping results in the migration of nearby plumes, what procedures would be followed to avoid or remedy this pollutant migration?

Response: 2 Studies by CH2M Hill have already concluded that at the Hillview-Porter site (Watkins-Johnson) contaminated groundwater flows into the creek. Reference 27 and Appendix L discuss this in greater detail. There is no plan for groundwater pumping per se, however, it will be necessary to divert creek flows around the construction site as part of the contractor's water control program. Because the temporary diversion will not affect the groundwater, we do not expect any significant change in the nature of contaminant plume. Thus, no mitigation or remedy is anticipated.

Comment 3: What is the anticipated scope of pre-excavation soil and groundwater testing, including the number and location of samples and the types of tests that will be conducted? Note that such testing should be conducted along the entire length of the project in order to accurately assess the potential for encountering contamination during construction.

Response 3: As discussed in Appendix L, Stage 1 of the Management Plan consists of pre-construction groundwater and soil sampling. As of this date there has been a cursory study of the groundwater and contamination problems as discussed in references 27, 28 and 29. Over the next four years, our understanding of the groundwater should be greatly increased as a result of those on-going studies. These data will be supplemented with soil borings taken along the proposed alignment at 300-foot intervals by the District. Exploratory trenches may also be used to supplement soil boring information. Soil borings will be analyzed for the presence of toxics. If toxics are found, the soil will be classified according to state standards and disposed of at an approved site.

Comment 4: Is it possible that contaminated groundwater could enter flood control channels after construction? Is it possible to address this issue on an on-going basis?

Response 4: This situation already exists in the vicinity of the Watkins-Johnson site as discussed in reference 27 and Appendix L. It does not exist and is less likely to occur along the Matadero Bypass channel because the groundwater level is generally below the proposed depth of excavation. Contamination groundwater will continue to enter the flood control channel in the vicinity of Watkins-Johnson as it has been in the past, but probably will not enter the proposed bypass unless the groundwater levels increase several feet in the vicinity of Varian.

Stanford University (Letter of 2-23-88)

Comment 5: What are the potential time delays during construction associated with contamination-related issues, and how does the District intend to mitigate these delays? We are concerned with any such delays because a great deal of ground surface will be disturbed and rendered unusable for our tenants during the construction phase.

Response 5: The objective of our proposed pre-construction testing program is to eliminate potential time delays during construction.

The District plans to avoid potential time delays during construction by executing agreements before construction begins. The agreements will be between Stanford, the respective lessees, and the District and will address the cost responsibility and liability for the disposal of classified wastes, if any are encountered. By clearly pre-defining the roles and responsibilities of the District, the lessees and Stanford, construction delays will be greatly reduced. Please refer to Appendix L for further discussion of this issue.

Comment: 6: Stanford has a strict policy with regard to preserving existing trees and approving the addition of new specimens. We will work closely with the District to insure that only necessary trees are removed. Stanford will need to approve the District landscape architect's proposed new tree specimen types and sizes; generally speaking when a large tree has been removed, a large specimen (36-inch box size) should replace it.

Response 6: We plan to work closely with Stanford on this issue and we do not see conflict in our respective goals.

Varian

Comment 1: Varian requests the SCVWD plan construction activity in such a way as to minimize the amount of soundwall disassembled for access and to reassemble the wall promptly following completion of the project. Varian also requests that the SCVWD consider the need to maintain as much of the landscaping as possible in their planning. Careful planning, acceptable to Varian, should be used in the selection of replacement vegetation in areas where removed.

Response 1: We concur with all of the above statements and we will coordinate with Varian during the design phase of the project.

Comment 2: Varian requests that the SCVWD continue close coordination with the Varian facilities and security staffs during planning, design, and construction of the project in Reach 7B to achieve mutually acceptable arrangements.

Response 2: We recognize your concerns and plan to work closely with you and Stanford. Issues to be addressed include providing temporary fencing during construction, minimizing impacts to your parking lot, restoring pavement upon completion and landscaping the 50-foot wide easement area.

Comment 3: A right of way easement will be required from Stanford University for the section of Reach 7B that passes through the Varian parking lot. Under terms of the leases between Stanford and Varian, easements granted by Stanford are subject to review and consent from Varian. Additionally, Varian will require the SCVWD to enter into an access agreement with Varian prior to undertaking construction in order to specify the terms of access to Varian's property and responsibilities and liabilities of the parties.

Response 3: Comments noted.

Watkins-Johnson

Comment 1: Due to the sensitive nature of our products and their susceptibility to dust contamination, we filter all outside air and in many cases, we further process the air for clean room environments where the presence of particulates would be especially threatening to our processes. If excessive amounts of dust are raised by the construction, our air filters could become clogged and degrade the quality of air flowing into the buildings with serious implications for our products.

Response 1: Every reasonable measure will be taken to reduce dust generation in the vicinity of your facility. Examples of special measures include wetting exposed surfaces and eliminating excavation activities on extremely windy days.

Comment 2: Operational efficiency requires safe unimpeded vehicular and pedestrian traffic flow between the six buildings on our site due to the interaction of our manufacturing activities and supporting services which are located throughout our facility.

Response 2: Some temporary inconveniences will occur as a result of the construction activity but measures will be taken to assure that safe access is provided. We will work with you during the detailed design of the project to identify your specific access needs and ways to mitigate the temporary inconveniences.

Barron Park Association

Comment 1: Total flow from Stanford Channel is taken as 200 cfs. Does this 200 cfs include the added runoff from Stanford which will occur as a result of new building planned in the Matadero watershed? What is the present flow in the Stanford ditch as it enters Matadero Creek? How much more runoff will this impervious cover cause during a 100-year flood?

Response 1: The 200 cfs inflow from Stanford Channel is the estimated one percent peak flow rate from that watershed subbasin based on the General Plan that was in effect in 1977. Changes in runoff characteristics as a result of land use changes will have to be addressed and mitigated under CEQA. Please see response to General Comment 2 regarding land development in the watershed.

Comment 2: The flow capacity of Barron Creek is given as 180 cfs on page J-1. In the past SCVWD has stated that the capacity is 210 cfs. Which is correct? Please show that the 600 cfs diversion culvert will be adequate to prevent flooding from Barron Creek in a one percent flood, with the added runoff from future upstream development.

Response 2: The capacity of 210 cfs quoted in the past was an estimated value based upon conditions of full flow through the Los Robles Avenue culvert with incipient flooding at Laguna avenue. In contrast, the "design" capacity of 180 cfs, as stated in Appendix J, refers to the ability to safely carry the flow without flooding, i.e., with freeboard.

The 600 cfs design capacity of the Barron Diversion Channel is based on allowing 160 cfs to exit from the outlet pipe of the Barron Sediment Basin. Between Gunn High School and Laguna Avenue the combined contribution of storm drains and overland flow may add 20 cfs to Barron Creek bringing the total one percent design flow rate to 180 cfs which could safely pass through the Los Robles Avenue culvert system.

Please refer to General Comment 2 regarding upstream development.

Comment 3: How will low flows from the Stanford Channel be handled during the construction of the Matadero Bypass channel? We urge that if a temporary bypass is used that it not be placed in the right of way behind Chimalus Drive homes.

Response 3: Between Varian Building 2 and the City's bike path, the proposed limits of construction will be within the Varian parking lot, low flows will probably be diverted into the existing pipe which will remain. From El Camino Real to Varian Building 2 construction will be within the District's 50-foot-wide easement because of constraints of the adjacent buildings. Any temporary bypass pipe required for low flows will likely need to be located within the right of way but this is not expected to be a large obstrusive pipe.

Comment 4: Would either the flow rate or the water depth in the flood basin be increased if future upstream development on Stanford lands covers 25 acres or more with impervious paving and buildings. Could simultaneous high flows from Barron and Adobe Creeks cause Matadero Creek to back up?

Response 4: Please refer to General Comment 2 regarding upstream development. The design condition evaluated considers simultaneous one percent floods on the three creeks tributary to the Palo Alto Flood Basin. The methodology used to develop the combination of flood basin water surface elevations and creek inflow rates is described in Appendix G.

Barron Park Association

Comment 5:	On page 87, it is stated that flow rates above 350 cfs will be diverted into the Matadero Bypass. The one percent design condition will allow 1,300 cfs to flow down Matadero Creek and 900 cfs will be diverted into the bypass. Is this added 950 cfs (1300 - 350 = 950) due to higher flow rates or is there a change in the efficiency of the bypass intake structure?
Response 5:	For clarification, when a Matadero Creek flow rate of about 350 cfs is exceeded in the natural channel upstream of Bol Park, diversion of flow into the Matadero Bypass channel will just be initiated. Below 350 cfs no flows will enter the bypass but will flow entirely down the natural creek. At the one percent design condition the approach flow in Matadero Creek will be 2,200 cfs of which 900 cfs will be diverted into the bypass and 1,300 cfs will be allowed to flow downstream in the natural creek. An additional 600 cfs from the Barron Diversion Channel will be added to bring the total one percent Matadero Bypass flow rate to 1,500 cfs. Finally, 200 cfs will be added from Stanford Channel to attain 1,700 cfs.
Comment 6:	On P. 92 & P. N-42 it is stated that the Barron Creek bypass culvert construction will remove trees and shrubs, but the only mitigation is grass reseeding, and on P. N-42 that no mitigation is required. This is unacceptable. Any trees and shrubs which are removed must be replaced at least one for one. We have a serious concern that the planning study does not make a commitment to minimize removal of vegetation and to replace any removed or damaged mitigation with equivalent plantings. It is important that the verbal expressions of concern made by staff and board members be made clear and firm in the written documents.

Barron Park Association

Response 6: The District will replace any trees and shrubs that would be removed by the diversion channel. Native shrubs such as coyote brush would be expected to return as a result of natural re-invasion. All mitigation measures stated in the final Negative Declaration will be implemented by the District.

Comment 7: SCVWD expects to maintain the open reach of Barron Creek by obtaining easements, and working from Los Robles per P. 54 & 100. In the past, most property owners on Barron Creek (in this reach) have refused to grant easements. SCVWD policy is not to accept easements on part or scattered sections of a creek. Will easements be required from all property owners or will SCVWD accept easements from a portion of them? What will the impact be if no or incomplete easements are obtained and SCVWD is unable to clean or devegetate the creek?

Response 7: Of paramount importance and an integral part of the proposed project is the ability to properly maintain the completed facility. An important aspect of maintaining capacity in the Los Robles Avenue culvert is to minimize the likelihood of clogging at the intake because of debris. The source of debris that may clog the intake is primarily the semi-natural channel reach from Laguna Avenue upstream to the Gunn High School sediment basin. Without continuous easement along this and all other reaches of the project area we cannot adequately maintain and control use of the creek. Therefore, the District will require continuous easements along this reach as a prerequisite to undertaking the Barron diversion component of the project. We trust that residents along this portion of creek will see the benefits to be gained and hope for their cooperation. If necessary, the easements will be acquired through power of eminent domain. As a clarification on the maintenance measures that would be required, please refer to the chapter on maintenance program guidelines. The main concern is with loose debris that could clog the intake. It will not be necessary to "devegetate" the creek.

Comment 8: The safe flow for Matadero Creek is given on page 92 as 1,300 cfs at Bol Park. Hasn't Matadero Creek actually carried over 1,500 cfs without flooding in the past?

Response 8: We estimate that 1,500 cfs is the bank full capacity of Matadero Creek near Matadero Avenue. To provide freeboard, for safety factor, the design flow rate needs to be limited to about 1,300 cfs. In the January 1983 flood, the USGS stream gage station downstream of El Camino Real recorded a peak flow rate of 1,500 cfs. We estimate that at the peak about 100 cfs overflowed near Matadero Avenue.

Comment 9: The discussion of adverse impacts along Reach 7B between Varian and the homes on Chimalus is incomplete. Assurances must be given that every effort will be taken to preserve trees, especially the larger ones. Construction along this section should be accelerated to minimize the time that residents will be impacted. If the Varian soundwall is removed to facilitate construction, it should be replaced as soon as possible. Hours of construction should be adjusted to minimize adverse impacts on the neighbors and loud noises and disturbance should be avoided as much as possible. In no instance should construction hours and noise be in violation of the Palo Alto Noise Ordinance. Construction should not begin before 8:00 a.m. weekdays, 9:00 a.m. Saturdays and 10:00 a.m. Sundays.

Barron Park Association

Response 9: Page 83 of the Engineer's Report states "Where it is needed, the south side of the (bypass) trench will be shored to minimize disruption and disturbance to the existing mature trees". As noted in the plans, "portions of the existing concrete soundwall will be temporarily removed during construction". These areas will be limited to between Stations 15+00 and 16+00 and at Station 25+60 along the bypass channel. Finally, the noise ordinance of the City of Palo Alto will be met by the contractor.

Comment 10: We also ask that equipment and supplies be stored at the front of the Varian parking lot between Varian Building 1C and El Camino Real. Access to the easement behind Chimalus should be from the El Camino end. A temporary fence should be erected across the easement at the Kramer and Witt homes (see maps 12B and 13B), to prevent casual access to the area behind the homes during construction.

Response 10: Temporary construction access easements will be required from Varian subject to their approval and review. Access to the downstream portion of the bypass channel must be provided at both ends to allow adequate construction mobility. Access points are proposed near Stations 6+00 and 15+00. A temporary fence will be provided near the access at Station 15+00 (Kramer and Witt residences) to provide needed security, privacy, etc.

Comment 11: Will there be any local drains into the bypass culvert in Reaches 7B, 8B or 9B? We urge that any drains have one-way valves to prevent water from being forced back up the drainage laterals onto adjacent property. Residents along Chimalus who live adjacent to the area where the bypass culvert will be in the Varian parking lot beyond the soundwall expressed a desire not to have surface drains running into the culvert near them because of fear that high flows in the culvert will force water up the laterals onto their property. What adverse impacts may occur from lowering the sanitary sewer shown on Map 12B? How many properties would be affected? How can any adverse impacts be mitigated?

Response 11: It is likely that there will be local storm drains that will outfall into the proposed bypass channel. There are several drop inlets in the Varian parking lot that presently outfall into the Stanford Channel 84-inch pipe and these will probably be re-routed to outfall into the bypass. For either case, they will be fitted with flap gates to prevent reverse flow at the outfall. There should not be any adverse impacts of lowering the existing sanitary sewer that crosses the proposed bypass.

Comment 12: Reach 8B, the bike path and SPRR right of way, would be essentially devegetated to accommodate a parallel bypass bike path during construction (N-41, 42). We strongly recommend that the bike path be closed temporarily in this section and that construction be accelerated. Please note that on page K-1 and Map 19 there is reference to detouring the bike path via an existing gate to McGregor Way. Please be informed that the gate and paved area is a private driveway not a public right of way. An easement exists for school district uses but not for necessarily the proposed bypass.

Response 12: We prefer the temporary bike path closure alternative but the City of Palo Alto has indicated a detour must be incorporated to provide for continuous operation of the path. With regard to the gate on McGregor Way, this is the preferred detour route and has received tentative approval from the City. The use of this gate and the access will be negotiated with the property owners to allow a temporary easement prior to construction. Information from the City of Palo Alto indicates there are two existing easements at this access point; one 15-foot wide easement to Palo Alto Union School District and one 10-foot wide easement for the roadway.

Comment 13: Along Reach 9B, there will be loss of at least seven trees but mitigations on page N-42 mentions replanting with groundcover only. Replanting must include at least as many trees of similar size as are removed during construction.

Response 13: See response to General Comment 3.

Comment 14: In the past, SCVWD practice has been to wait one or two years after completion of a construction project before re-landscaping. Because the bypass culvert will pass through a park and close to many homes, it is unacceptable to wait so long before replanting. Therefore, we ask that replacement plantings begin in the same year that construction is completed. It should be stated explicitly that irrigation systems will be provided and maintained at least until all new trees and shrubs are three or four years old.

Response 14: Please see response to General Comment 3.

Comment 15: On page 77, it is noted that two property owners who have refused to grant maintenance easements will be asked to grant them. Who are the property owners and what will the impact be if they continue to refuse? How extensive would the maintenance be?

Response 15: As indicated on the plans, County records show that the two parcels are owned by Wilson and Fitzgerald. We hope that an easement can be negotiated as part of the overall project. It is District policy to obtain continuous easements along creek channels to provide for their maintenance and these two parcels clearly are a "missing link". If easements can not be negotiated they would be acquired through power of eminent domain. Maintenance measures would consist primarily of monitoring for erosion and the removal of debris jams, as discussed in the Maintenance Program Guidelines chapter.

Comment 16: Reach 10 will have a new box culvert installed at Watkins-Johnson, requiring a wider right of way (page 89). Will this culvert provide adequate flow in Matadero Creek at the bridge just downstream of Hillview? Map 15 shows the proposed new right of way includes an occupied cottage on the Glover property. Will this cottage be disturbed or damaged in any way by acquisition of the right of way and construction of the culvert? If so, what mitigations are proposed? Map 15 also shows the inlet diversion structure is rather close to the Bol house. Will there by any disturbance or damage to the Bol house from construction of the diversion culvert or other construction? Who owns and maintains the critical silting basin in Reach 10 (page 99)?

Response 16: The parallel box culvert proposed at the Watkins-Johnson site has been designed to work in concert with the existing culvert to safely carry the one percent design flow rate (2,200 cfs).

The existing cottage on the Glover property located in Reach 10 near Station 253+00 will not be disturbed in conjunction with the proposed easement acquisition. If erosion problems develop in the future, the cottage may need to be purchased and removed at such a time if it is threatened. The principal purpose of the easement is to provide continuous maintenance access and control.

Barron Park Association

The bypass intake and diversion structure is located close to the Bol structure. The area is shown in greater detail on Plan Sheet 21. There is a clear distance of about 18 feet between the structure and the proposed bypass channel, about ten feet between the structure and the proposed top of sloping bank on the creek transition.

The stilling basin in Reach 10 dissipates energy of flow from the Watkins-Johnson box culvert so that erosion will not occur in the downstream natural channel. The District presently has an easement that includes the stilling basin.

Comment 17: Map 19, Barron Diversion Channel, appears to show the culvert passing through, rather than around, Strawberry Hill. This hill is visible near the map fold below "Gunn High School". The culvert should be bent or rerouted in this area so that no excavation and rebuilding of the hill is required. The elevations shown on Map 19 are incorrect. Station 12.50 should show a hill not a steady decline in elevation.

Response 17: The alignment of Barron Diversion Channel will pass through Strawberry Hill because of the hydraulic, maintenance, and construction forming advantages of a straight alignment. The existing ground elevations in the immediate vicinity of Strawberry Hill have been corrected on the plans and indicate that shoring of the trench may be required through the area. Existing contours will be restored following construction of the diversion structure.

Comment 18: How will the Hetch Hetchy pipeline be protected during construction? Damage to this waterline will have severe adverse impacts on water service from Los Altos to San Francisco.

Barron Park Association

Response 18: We have been working with San Francisco Water Department to address this concern. The SFWD has already located and surveyed the tops of pipes at the diversion intake and the elevations are called out in our plans. Appropriate measures will be taken during construction to safeguard the pipes.

Comment 19: Reach 11 near Watkins-Johnson passes three known toxic spill sites, and as many as seven other toxic spills are suspected in this watershed. Pollutants from spills have been found in Matadero Creek. What actions and precautions will be taken to avoid spreading the pollutants and preventing additional spills into the creek? Will there by any monitoring to assure that no future spills occur and contaminate Matadero Creek.

Response 19: Please see response to General Comment 1.

Comment 20: The BPA requests that a liaison group be established to act as a focal point for bringing residents concerns and complaints to the attention of appropriate SCVWD personnel, and to inform residents of activities and plans for construction. The most logical organization is the Creek Committee of the BPA, in conjunction with the entire BPA Board.

Response 20: We agree that such a committee would be helpful to both the community and the District. We would like to limit the number of members that interact directly with our District personnel to avoid confusion or inefficiency. We will not allow citizens to interact directly with the contractor except for one BPA representative who will attend periodic meetings of the District, the City and the Contractor. These points were outlined in our response to BPA request #12 in our letter of September 23, 1987.

Joyce Karst

Comment 1: My property at 488 James Road has not in any way had the least problem with flooding (last ten years) and I definitely do not want to pay for this proposed work!

Response 1: The area near your home would be subject to shallow sheet flooding (less than one foot deep) during a one percent (100-year) flood. The flooding would originate from Barron Creek overflows at Laguna Avenue. Barron Creek flooded at this location during 1982 and 1983 and almost reached your street. The magnitude of the 1982 and 1983 events are about a 15 and 20-year flood respectively.

In addition to the benefit you would derive from the elimination of shallow sheet flooding near your home you would also gain the indirect benefit of nearby streets, shopping centers, businesses, etc. that would not be subject to flooding.

In November 1986 voters in the Northwest Flood Control Zone (which includes all of Palo Alto and several other cities) approved Measure F by nearly 70%. Measure F increased the flood control benefit assessment rates from roughly $12 per year to $40 per year per home to fund construction of needed flood control projects. Therefore, existing benefit assessment revenues, in combination with the District's allocation of the 1% property tax, will cover the cost of the Matadero and Barron Creeks flood control project. No new or additional taxes or assessments will be imposed.

Allan Coleman

Comment 1: I have reviewed the "feasible alternatives" for the proposed Matadero and Barron Creeks flood control projects and wish to file a written protest against all the alternatives. The project is unnecessary. The only action necessary is to continue the periodic clearing of trash and obstructing vegetation from the stream channels.

Response 1: The project is needed to prevent potentially devastating floods. Your home on Shauna Lane is only one block from Barron Creek at Laguna Avenue, the most frequent source of flooding. The underground pipe below Los Robles Avenue has capacity to carry only about a five-year flood when completely clean. On a long-term average some flooding could be expected about every five years. The January 1983 flood caused damage and disruption to many homes and yet was only about a 20-year flood event.

Where the District owns right of way, we maintain the creeks, channels, and culverts. We maintain the trashrack and underground pipe below Los Robles Avenue but the fact remains that this pipe is just too small regardless of maintenance.

Upstream of Laguna, the creek is privately owned. As part of this project, the District will acquire an easement along the creek for purposes of maintaining the channel.

The project also will provide flood protection up to the 100-year flood and eliminate the frequent overflows at Laguna Avenue on Barron Creek.

Herbert Foster

Comment 1: All of the alternatives in your December 21 letter are wrong! The environmentally correct solution is to catch the rain upstream and to return the water to the underground water lens through percolation ponds.

Response 1: An upstream flood control reservoir had been studied early in the flood control investigation. Upstream reservoirs were considered previously in 1957 and not pursued because of the excessively high land acquisition costs. Since 1957, the potential reservoir sites have been more heavily developed and land values have escalated substantially. Upstream reservoirs and percolation ponds have thus become prohibitively expensive.

In terms of solving the flooding problem, a series of small percolation ponds would not be technically feasible because flood flows are on the order of several hundred to thousands of cubic feet per second, and percolation rates are generally one to two cubic feet per second. For these reasons, the reservoir/percolation pond alternative is not feasible.

John Byrne

Comment 1: I am not persuaded on the inevitability of the one percent (or 100-year) flood and the estimated $28 million in damages that would result therefrom. Additionally, if the proposed improvements are constructed at a cost of $20.6 million, who is to say that a 0.4 percent (or 250-year) flood coinciding with a significantly higher than average tide on the bay would not swamp the system? Nature is invariably on the side of the hidden flaw.

A better approach might be to spend $20.6 million to convert uplands to open space, thereby precluding their being covered with acres of rooftops, driveways, tennis courts, and new and "improved" roads, etc., all of which are 100 percent nonabsorbant and therefore guaranteed contributors to the flows that Matadero and Barron Creeks must carry.

Let me also express concern over decreasing maintenance of existing facilities. I believe that in years past the District cleaned its channels -- or at least Adobe Creek near my residence — every year of its accumulations of rocks, sediment, grocery carts, and the like. I note that this channel has not received such attention of late, witness (in addition to a fair amount of trash) weeds growing in the dirt at the bottom of the channel and what appears to be a small (four or five-foot) tree growing out of a crack in the channel wall near Charleston Road.

Response 1: As explained in Appendix C of this report, the one percent flood has, by definition, a probability of occurrence of 1% in a given year. However, this risk is cumulative year after year and over the life of a 30-year home mortgage the probability of occurrence approaches 30%. The $28 million damage resulting from a single one percent flood is a conservatively low estimate that is based upon floodplain mapping, depth-damage relationships for buildings and their contents, and current value of structures and their contents.

The proposed project has been designed to safely carry the one percent flood flow with a safety factor (freeboard). If a larger than one percent flood were to occur it would first encroach into the freeboard before actual flooding could occur. Though it is technically not considered to be designed for it, the system could actually convey greater than a one percent flood.

Freshwater creek flooding and tidal events (tidal flooding) are separate and independent events and, therefore, the compound probability is the product of their individual probabilities. For example, the probability that a one percent flood will coincide with a one percent tide is one in ten thousand. Additionally, the three creeks that flow into the Palo Alto Flood Basin (Adobe, Barron, Matadero) do not directly interact with San Francisco Bay but are separated by the tide gates of the flood basin. Nevertheless, your statement that it is possible that a more extreme event could occur and result in flooding is true but not very likely. More importantly, the project will dramatically reduce the expected annual flood damages.

Purchasing land in the upper watershed is not a cost effective solution to the existing flood problem. The varied land uses that now exist in the watershed already produce more runoff than can be handled by the existing downstream channel. See response to General Comment 2 regarding future development.

K. Knute Kresie

Comment 1: Does SCVWD recognize the increased maintenance burden these proposed underground channels represent?

Response 1: Yes. Evaluating the long-term maintenance requirements is part of the planning process. A chapter in this report is dedicated to the maintenance needs.

Comment 2: Were the future maintenance costs of the project alternatives expressed in present value form for comparing the costs of these alternatives?

Response 2: No. The projected future maintenance costs do not substantially differ for the various alternatives and when expressed in present value terms are a small percentage of total project cost.

Comment 3: Is SCVWD committed to delivery of whatever maintenance is required to convince Barron Park residents that these channels will work as designed when the need "arises"?

Response 3: We are committed to a level of maintenance necessary to ensure that the facilities will perform as designed.

Comment 4: What methods will SCVWD use to inspect and clean the two underground channels being proposed? How frequently will inspections be done?

Response 4: Inspections will be conducted at least once each year prior to the rainy season by walking the underground culverts. Minimal cleaning is anticipated because the system has been designed to minimize sediment deposition. Rubber tired front end loaders will likely be used if necessary.

Comment 5: How about some sort of self-cleaning screens on the channel inlets.

K. Knute Kresie

Response 5: Combination trashracks and safety grates will be placed at the intakes to both the bypass and diversion channels. These racks are designed to prevent large floating debris from entering the channels.

Comment 6: What experience does SCVWD have in maintaining underground channels of similar cross section and length?

Response 6: The District has maintained several underground culverts in this County for a number of years. With this experience the District has learned that the most serious problem is sediment deposition in a long, relatively small diameter (less than 6 feet) pipe culvert. Both the Matadero Bypass channel and the Barron Diversion channel are "high flow only" culverts and will not carry heavy sediment loads that occur in many creeks. Large floating debris will be removed at the intake and what smaller floating debris enters the culvert will be carried through.

Comment 7: Would making the Barron Creek diversion channel eight feet high rather than the proposed six feet high allow maintenance costs to be reduce to an extent that would justify the additional initial expense?

Response 7: No. The expected maintenance of the Barron diversion channel is minimal because the upstream sediment basin and trashracks will limit the need to remove such debris. An additional estimated expense of over $100,000 is not justified in the project cost.

Merry Free Osborn

Comment 1: Why is it so necessary for there to be a bike path during the short duration that there will be work in progress in this area?

Response 1: This is a requirement imposed on us by the City of Palo Alto as indicated in Comment 8 of the City's letter in this Appendix. We prefer to close the path and avoid disruption to vegetation and the additional costs of mitigation.

Comment 2: Why does the culvert have to follow the exact route of the existing bike path. Couldn't it go to the left of the existing path and then allow the existing path to remain open during the work in this area?

Response 2: The proposed box culvert will be located under the existing bike path so that the roots of trees and other vegetation will not be impacted. If the culvert were to be located to one side the amount and type of vegetation growing there would be limited.

Comment 3: Why does the temporary bike path have to be put in on right hand side of the existing path and cause the removal of the green belt trees that will take 20 to 40 years to replace?

Response 3: The proposed temporary path would be located on the left (west) side of the existing bike path to minimize removal of vegetation.

Jennifer Raymond

Comment 1: First, I am concerned about the trees which border the SCVWD easement in Boulware Park. These include several large eucalyptus and pines located right next to the fence on the southwest side of the creek. I was assured by you, during our discussion at the meeting, that these trees will not be damaged or removed. If, for any reason, this is not the case, I would request that they be replaced by trees of like kind and size.

Response 1: It is our intent to preserve all of the trees outside our existing right of way. As you point out, many of the trees are very close to the fence and some may be affected as a result of adjacent excavation during construction. It is policy of the District to mitigate whatever impacts occur as a result of a project. If, for example, a 30-year-old tree were to be removed as a result of the project it is not practicable to replace in kind. We would replant several smaller size species of the same tree to mitigate its loss.

Comment 2: My second concern has to do with any re-routing of traffic that may be necessary during construction of the Lambert Avenue bridge. Lambert Avenue is fairly heavily travelled, especially by large industrial vehicles. In the event that a detour is necessary, I would ask that this traffic not be detoured through the adjacent residential area, i.e., down Fernando and Margarita Avenues.

Response 2: Traffic analysis studies of all the nine bridges proposed for replacement will be completed. These studies will include evaluation of the closure and staged construction alternatives for the bridges. If the closure option is selected a community meeting will first be held at which time the results of the traffic detour study would be presented.

Jennifer Raymond

The closure and detour plans must meet with the approval of the City of Palo Alto and general acceptance of the affected community.

Comment 3: I am concerned about the long-term building plans for Stanford Research Park and the ability of the Stanford Channel to handle the increased run-off. Has this been considered in your calculations?

Response 3: Yes. Please see response to General Comment 2.

Comment 4: A number of individuals in the neighborhood are concerned that, if easily accessible, the Matadero bypass could become a "hangout" during times of low flow. We would like to see the confluence designed in such a way that access to the bypass will be minimized.

Response 4: The channel downstream of the confluence will be fenced off as it presently is. The section of Stanford Channel immediately upstream of El Camino Real is presently an open channel and will be converted to an underground culvert making it less accessible.

El Camino Center

Comment 1: We own the property adjacent to the creek between Park Boulevard and Lambert Avenue. The property will eventually be redeveloped as residential in the future and we would like to cover portions or, possibly, all of the creek.

Response 1: We generally oppose a complete covering of the creek because of environmental impacts the problems it creates for visual inspection and maintenance access and operations. If, when you redevelop your property, there is a need for a bridge crossing we shouldn't have any objections. However, a permit would be required, subject to a detailed review of your proposal.

Comment 2: We are very concerned about the esthetic appearance of the sidewalls to the proposed U-frame channel. It is our understanding the the SCVWD is willing to grade to the top of the wall so that none of the sections of the wall would be visible. Additional landscaping and planting could, therefore, be placed adjacent to the walls of the proposed U-frame channel.

Response 2: We will provide grading within our right of way to cover the wall on the outside of the U-frame channel. Landscaping is not proposed as part of the project but could be installed in the future by adjacent property owners. Fencing will also be required and may need to be relocated depending on your proposal.

Comment 3: It is our understanding that the bridge on Park Boulevard over the creek will be raised and we are very concerned how this will affect the Park Boulevard entry to our warehousing complex. We are concerned not only about two-way ingress and egress to our property, but we are also concerned about drainage to that area.

El Camino Center

Response 3: The road surface, curbs, gutter and sidewalks in the vicinity of the Park Boulevard bridge over Matadero Creek will be raised about one foot. Grading and necessary modifications to adjacent driveways, parking lots, and storm drains will be included as part of the project.

Comment 4: Our property has two large storm drains that dump through the sidewalls of the Matadero Creek. We have a 15-inch steel pipe that runs from the warehousing complex through the sidewall of the creek, about 60 feet west of Park Boulevard. We also have a drop inlet that opens into the creek about 30 feet east of Park Boulevard. We are concerned that should the water level within the channel rise above the grade of our property that water from the channel could back up through the discharge pipes and flood the El Camino Center. We, therefore, would request that a backflow device be installed where the pipes enter into the creek so that this can be avoided.

Response 4: Flap gates will be installed as part of our project at the outfalls of the storm drains when the new channel is constructed.

Comment 5: You have also indicated that on the south side of the Matadero Creek, the access road does not necessarily have to be within the chain link fence bordering on the edge of your easement and that if we redevelop the property in such a manner that parking was provided and that your vehicles could have easy access to the creek that the fence may be able to be moved back to the top of the wall. We would be interested in pursuing such an arrangement at such time as we redevelop the property.

Response 5: We are open to this modification in the future. A District permit will be required, subject to a detailed review of your plans.

Donald Frieberg

Comment 1: The proposed addition of the vertical concrete walls onto existing sloped walls would prevent toads from completing their life cycle, as they could not climb the vertical walls. Therefore, their habitat would be greatly reduced everywhere the vertical walls are present. The few existing truck access ramps lead directly onto the street, and therefore those toads that make it up the ramps would likely be crushed by cars.

The vertical flood walls would restrict the movements of Western Toads that utilize Matadero Creek for breeding habitat. During spring migrations from terrestrial habitat to the aquatic habitat of the creek and during migration of adults and juveniles from the water to the land, these toads will reach the floodwall and travel along its edge. As a result, they will be directed toward streets and sidewalks that will allow them access to their destinations. Access to the water would be available at ramps located throughout the proposed project. Some mortality would be expected from automobile traffic. However, because toads are generally nocturnal and prefer to migrate during rainy periods, the risk of mortality by autos is not as high as for diurnal species. Risks of predation are not increased since this species is poisonous to most animals if eaten. Risk of exposure to dehydration would be increased, however, and would be especially of concern to the recently transformed toads on their way to terrestrial habitat.

Pacific tree frogs which also inhabit the channel are agile climbers and would still be able to migrate into backyards. Toads could be collected from the channel and placed into backyards, and later transported back into the channel by homeowners if desired.

Response 1: The Western Toad is not listed as a threatened or endangered species and therefore the costs to incorporate special toad migration measures are not justified.

Shelia Dunec

Comment 1: My first recommendation is to provide additional full scale trees along the Varian parking lot as mitigation for the inconvenience, in terms of dirt and noise, caused by the Project to Chimalus Drive residents. The niches in the existing sound wall provide excellent planting sites for full scale trees which would eventually add much-needed screening of the industrial site for residents. I've discussed this proposal with Carl Clemm, Director of Facilities at Varian, and he is not opposed to the idea as long as it is incorporated into the overall landscape plan.

Response 1: This is a good suggestion that will be examined in greater detail for feasibility during preparation of the landscaping plan. If feasible, the District is agreeable to adding such landscaping.

Comment 2: My second recommendation, to make minor modifications to the concrete lining Matadero Creek between El Camino Real and Greer Road, is prompted by evidence that steelhead trout are attempting to return to this Creek. Matadero was originally a natural trout stream and according to Fish and Game Wildlife Biologist, Linda Ulmer, there is evidence that these native fish are attempting to return. Last winter, a mature adult succeeded in swimming all the way to the natural creekbed above El Camino; another died from exhaustion in the concrete portion of the channel near Greer Road.

Reponse 2: The Department of Fish and Game has required us to provide resting pools below the bridges downstream of Alma Street and a low flow notch in the new channel from Alma Street upstream to El Camino Real to provide for fish passage. These measures have been incorporated in the plans.

Medical Center

3801 Miranda Avenue
Palo Alto CA 94304

Veterans Administration

1/14 RRS
SNW
RET
KWW
BHG

JAN 11 1988

In Reply Refer To: 640/138

Robert R. Smith
Flood Control Manager
5750 Almaden Expressway
San Jose, CA 95118

Dear Mr. Smith:

We have reviewed the summary for the Santa Clara Valley Water District's Engineering Report for the proposed flood control project on Matadero and Barron Creeks that you sent to us on December 21, 1987.

So far as we can determine, the work will not directly impact on the Veterans Administration property, except for possible access during the actual construction. Therefore, we have no comments on the project.

We would appreciate it if you would continue to send us information on the status of the project and/or any revisions to the present plans.

Sincerely yours,

JAMES C. DeNIRO
Medical Center Director

"America is #1—Thanks to our Veterans"

STATE OF CALIFORNIA—OFFICE OF THE GOVERNOR

GEORGE DEUKMEJIAN, Govern

OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814

[illegible]

1/29 - BHG
SNW
RRS
RLT
KWW

January 27, 1988

Dr. Bernie Goldner
Santa Clara
Valley Water District
5750 Alamaden Expressway
San Jose, CA 95118

Subject: Matadero and Barron Creeks Flood Control Project
SCH# 87122908

Dear Dr. Goldner:

The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call Loreen McMahon at 916/445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

David C. Nunenkamp
Chief
Office of Permit Assistance

ALIFORNIA—OFFICE OF THE GOVERNOR GEORGE DEUKMEJIAN, Governor

CE OF PLANNING AND RESEARCH
ENTH STREET
AMENTO, CA 95814

2/10 BHG w/a
SNW
RRS
RRT
KWW

February 8, 1988

Dr. Bernice Goldner
Santa Clara Valley
Water District
5750 Alamaden Expresswat
San Jose, CA 95118

Subject: Matadero and Barron Creeks Flood Control Project
SCH# 87122908

Dear Dr. Goldner:

The enclosed comments on your draft environmental documents were received by the State Clearinghouse after the end of the state review period. We are forwarding these comments to you because they provide information or raise issues which may assist you in project review.

Lead agencies are not required to respond to late comments. However, you may wish to incorporate these additional comments into the preparation of your final environmental document.

Please contact Loreen McMahon at 916/445-0613 if you have any questions concerning the review process. When you contact the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

David C. Nunenkamp
Chief
Office of Permit Assistance

Enclosures

cc: Resources Agency

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alifornia Business, Transportation and ~~Housing~~ Agency

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morandum

: Loreen McMahon
State Clearinghouse
1400 Tenth Street, RM. 121
Sacramento, CA 94814

Date : January 25, 1988

File No.: SCL-82-23.6
SCH# 87122908
SCL82041

THIS COPY FOR
Les Ornelas
(PDTP)

From : **DEPARTMENT OF TRANSPORTATION** - 4

Subject : Negative Declaration: Matadero and Barron Creek Flood Control Project

The Department of Transportation (Caltrans) has reviewed the above-referenced document and forwards the following comment:

The work proposed on S.R. 82 and U.S. 101 has been reviewed by Project Development and our Hydraulics Department and we have no comments at this time. However, because part of the project involves work within State right-of-way, an Encroachment Permit will be required and another review will be necessary at that time. To apply for an Encroachment Permit please contact:

District Permit Engineer
P. O. Box 7310
San Francisco, CA 94120
(415) 557-1984

If you have any questions concerning this comment, please contact Ken Van Velsor of my staff at (415) 557-9224.

Gary F. Adams
GARY F. ADAMS
District CEQA Coordinator

cc: Jeff Georgevich, Metropolitan Transportation Commission

RE
JAN 27 1988
STATE CLEARINGHOUSE

KVV:em

bcc: LO, GEG, SR/MJJ, RC,
JD, KVV

STATE OF CALIFORNIA—THE RESOURCES AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) [illegible]
944-5500

2/11

February 9, 1988

5719 '88 FEB 11 P1:12

Mr. Keith Whitman, P.E.
Associate Civil Engineer
Predesign Division
Santa Clara Valley Water District
5750 Almaden Expressway
Santa Clara, California 95118

Dear Mr. Whitman:

Department of Fish and Game (Department) personnel have reviewed the Draft Negative Declaration for the proposed flood control project on Matadero and Barron creeks. During the field meeting on January 8, 1988, with Department representatives, additional hydrologic information was requested by Ted Vande Sande, Department Hydraulic Engineer, to ensure adequate passage for steelhead trout. Mr. Vande Sande's comments will follow under a separate letter.

The following concerns should be addressed and mitigation measures provided in the Final Negative Declaration.

1. Reach 5: Matadero Creek - Alma Street to Park Blvd.

   Linear feet of vegetation removed along existing channel at Alma Road should be replaced with native vegetation adjacent to the new channel.

2. Reach 7: Matadero Creek - El Camino Real to Matadero Creek

   The proposed flood control measures consist of leaving the existing natural stream channel and constructing an underground bypass, Reach 7B. One percent design flow rates will be 1,700 cfs for the bypass channel and 1,300 cfs for Matadero Creek. To provide for sufficient scouring flows in the natural channel, which will prevent long-term aggradation of sediments, we recommend the bypass channel inlet be designed to divert flows above 1,300 cfs only. In addition, the bypass channel should be designed to eliminate stranding of fish when the flow drops.

3. Reach 9: Matadero Creek - Laguna Avenue to Old SPRR Bridge

Erosion control measures proposed in the natural channel consist of stabilizing the banks and channel bottom in the area downstream of the old SPRR bridge. These measures will include removal of the existing gunite along the south bank of the natural channel and stabilization with gabions.

Woody debris and undercutting of the gunite bank have formed a series of pool habitats in the stream channel. This instream habitat should be replaced on a 1:1 basis. Enclosed is criteria for replacement of this habitat type using log V weirs. Other designs may be suitable, and plans should be submitted to our agency for approval.

We concur that revegetation with native plant species should be incorporated into the gabion bank stabilization design. In addition, we recommend that riparian trees be planted at the top of the bank to provide shading in the stream channel presently provided for by the undercut gunite bank.

In this reach, numerous sacked concrete dams have been placed in the channel by the Water District. They are barriers to fish migration at low and moderate flows and should be removed. This may be accomplished as part of the proposed project.

4. Reach 9B: Matadero Bypass - Matadero Avenue to Bol Park

The existing bike and pedestrian bridge over Matadero Creek will be replaced, and the stream channel will be lined with concrete. We recommend that baffles and a low-flow channel invert or grouted rock be placed in the stream channel to prevent creating a velocity barrier to fish migration.

In addition, we recommend that proposed gabion stabilization for existing erosion areas described in the Draft Negative Declaration be re-evaluated. Vegetation is present on the eroding banks, and the slumping of these banks has resulted in the formation of sediment bars (sediment buildup) adjacent to the banks which are supporting emergent riparian vegetation. Stabilizing the toe of the bank and planting native riparian trees and shrubs on the upper portion will provide stabilization and not eliminate wildlife habitat. If this is not acceptable, we recommend that the gabions be topped with soil and native shrubs beplanted. Native riparian trees should also be planted at the top of the bank to mitigate for the loss of natural revegetation presently occurring on the sediment bars.

The proposed access roads will eliminate vegetation adjacent to the stream channel and will result in breaks in the riparian corridor. The linear feet of vegetation removed should be replaced on a 1:1 basis with native riparian tree species, either along proposed gabion bank or in areas along Matadero Creek presently devoid of vegetation.

A 1601 streambed alteration agreement will be required prior to project construction. All mitigation measures recommended by our agency for protection of fish and wildlife habitats will be required conditions of this agreement. Please contact Linda Ulmer, Fishery Biologist, at (408) 458-0904; or Theodore Wooster, Environmental Services Supervisor, at (707) 944-5500, if you have any questions.

Sincerely,

Brian Hunter
Regional Manager
Region 3

Law Review Commentaries

Legal aspects of interregional water diversion. Gary D. Weatherford (1968) 15 U.C.L.A.Law Rev. 1299.

§ 1600. Declaration of public interest

The protection and conservation of the fish and wildlife resources of this state are hereby declared to be of utmost public interest. Fish and wildlife are the property of the people and provide a major contribution to the economy of the state as well as providing a significant part of the people's food supply and therefore their conservation is a proper responsibility of the state. This chapter is enacted to provide such conservation for these resources.

(Added by Stats.1976, c. 603, p. 1446, § 2.)

Stats.1976, c. 603, contained two sections designated "Sec. 2". See, also, Gov.C. § 14258.

Former § 1600, added by Stats.1961, c. 909, p. 2532, § 2, relating to similar subject matter, was repealed by Stats.1976, c. 603, p. 1446, § 1.

Derivation: Former § 1600, added by Stats.1961, c. 909, p. 2532, § 2.

Library References

Fish ⇐12.
C.J.S. Fish § 28 et seq.

§ 1601. Governmental agency or public utility; project changing bed of river, stream or lake; approval; arbitration panel

Except as hereinafter provided, general plans sufficient to indicate the nature of a project for construction by, or on behalf of, any governmental agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit, or will use material from the streambeds designated by the department, shall be submitted to the department. When an existing fish or wildlife resource may be substantially adversely affected by such construction, the department shall notify the governmental agency or public utility of the existence of such fish or wildlife resource together with a description thereof and will propose reasonable modifications in the proposed construction as would allow for the protection and continuance of the fish and wildlife resources, including procedures to review the operation of such protective measures. Such proposals shall be submitted within 30 days of receipt of such plans, with the provision that this time may be extended by mutual agreement. Upon a determination by the department and after notice to the affected parties of the necessity for an onsite investigation or upon the request for an onsite investigation by the affected parties, the department shall make an onsite investigation of the proposed construction and shall make such investigation before it proposes any modifications.

Within 14 days of receipt of the department's proposals, the affected agency or public utility shall notify the department in writing as to the acceptability of the proposals, except that this time may be extended by mutual agreement. If such proposals are not acceptable to the affected agency or public utility, then that agency or public utility shall so notify the department. Upon request the department shall meet with the affected agency or public utility within seven days of receipt of such notification or such time as may be mutually agreed upon for the purpose of developing proposals which are acceptable to the department and the affected agency or public utility. If mutual agreement is not reached at such meeting a panel of arbitrators shall be established; provided, however, that the appointment of such panel may be deferred by mutual consent of the parties. The panel shall be established within seven days of such meeting and shall be composed of one representative of the department, one representative of the affected agency or public utility, and a third person mutually agreed upon, or if no agreement can be reached, the third person shall be appointed in the manner provided by Section 1281.6 of the Code of Civil Procedure. The third person shall act as panel chairman. The panel shall have power to settle disagreements and make binding decisions regarding such fish and wildlife modifications. Such arbitration shall be completed within 14 days from the day that the composition of the panel is established, unless the time is extended by mutual agreement. Expenses of the department representative are to be borne by the department; expenses of the representative of the governmental agency, state or local, or the public utility are to be borne by the governmental agency, state or local, or the public utility; expenses of the chairman are to be paid one-half by each party.

Agencies or public utilities proposing projects affected by this section shall not commence such operations until the department has found that such project will not substantially adversely affect an existing fish or wildlife resource or until the department's proposals, or the decisions of a panel of arbitrators, have been incorporated into such projects.

The department shall determine and specify types of work, methods of performance or remedial measures which shall be exempt from the operation of this section.

With regard to any project which involves routine maintenance and operation of water supply, drainage, flood control, or waste treatment and disposal facilities, notice to and agreement with the department shall not be required subsequent to the initial notification and agreement unless the work as described in the agreement is substantially changed, or conditions affecting fish and wildlife resources substantially change, and such resources are adversely affected by the activity conducted under the agreement. This provision shall be applicable in any instance where notice to and agreement with the department has been attained prior to the effective date of this act.

The provisions of this section shall not be applicable to emergency work necessary to protect life or property; however, notification by the agency or public utility performing such emergency work shall be made to the department within 14 days of the commencement of such emergency work.

(Added by Stats.1976, c. 603, p. 1446, § 2.)

Former § 1601, added by Stats.1961, c. 909, p. 2532, § 2, amended by Stats.1970, c. 1357, p. 2522, § 1, relating to similar subject matter, was repealed by Stats.1976, c. 603, p. 1446, § 1.

Derivation: Former § 1601, added by Stats.1961, c. 909, p. 2532, § 2, amended by Stats.1970, c. 1357, p. 2522, § 1.

§ 1601.5 *Repealed by Stats.1976, c. 603, p. 1446, § 1*

The repealed section, added by Stats.1970, c. 1357, p. 2522, § 1.5, provided for review of modifications prior to submission to arbitration panel. See, now, § 1602.

§ 1602. *Review of modifications prior to submission to arbitration panel*

In addition to the provisions of Section 1601, the department, following submission of the modifications referred to in Section 1601, shall by mutual agreement with any state agency proposing such project, establish such procedures that the parties deem necessary to provide adequate review of the proposed modifications and consideration of alternative conditions designed to protect existing fish and wildlife resources. If no agreement can be reached between the department and the state agency proposing the project, the procedures for arbitration specified in Section 1601 shall then apply.

(Added by Stats.1976, c. 603, p. 1446, § 2.)

Former § 1602, added by Stats.1961, c. 909, p. 2532, § 2, amended by Stats.1970, c. 1357, p. 2524, § 2, relating to diversion or obstruction of natural flow, notice, and authorizing arbitration in absence of mutual agreement, was repealed by Stats.1976, c. 603, p. 1446, § 1. See, now, § 1603.

Derivation: Former § 1601.5, added by Stats.1970, c. 1357, p. 2523, § 1.5.

Index to Notes

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Indian reservations 1
Notice 5
Pump diversions 4
Settling ponds 3

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1. Indian reservations

On recognized Indian reservations such as the Hoopa Valley Reservation, the provisions of this section apply to loggers or other operators who are not Indians but who are logging standing trees purchased from the Indians. 66 Ops.Atty.Gen. 384, 9-7-73.

2. Gravel removal

This section is applicable to gravel removal within the annual high water mark of stream or river or lake and all areas within a leveed system. 66 Ops.Atty.Gen. 360, 6-26-73.

3. Settling ponds

This section is applicable to construction of a settling pond within a dry streambed which will or may result in altering a river bed or streambed to which it is tributary. 66 Ops.Atty.Gen. 360, 6-26-73.

4. Pump diversions

This section is applicable to pump diversions if such diversion is singly or in combination with other diversions capable of substantially diverting the natural flow of a stream. 66 Ops.Atty.Gen. 360, 6-26-73.

City of Palo Alto

P.O. BOX 10250
PALO ALTO, CA 94303

Public Works-Engineering
(415) 329-2296

1/26-RRT
SNW
CHG
RRS
KWW

January 25, 1988

Mr. Randall R. Talley
Division Engineer
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Review of Engineer's Report and Draft Negative Declaration for Matadero and Barron Creeks

Dear Randy:

Thank you for the opportunity to review this project. It is clear that the completion of this project will result in many benefits to our community in the area of flood control.

While the majority of the City of Palo Alto's comments regarding this project will surface at the actual design stage of the individual phases of this project, we have the following comments at this time:

1) Appropriate permits issued by the City of Palo Alto will be required for the various phases of this project. Conditions of these permits will be generally the same as for other District projects except as dictated by site conditions.

2) The project Contractor will be required to post a bond in an amount to be determined by the Public Works Department for protection of City streets, sidewalks and similar facilities in the area of the project. Additionally special insurance or bonding will be required for work near the high-voltage cable lying adjacent to the Matadero Channel. This bond or insurance shall be in a form and amount which is acceptable to the City's Risk Manager.

3) Special inspection will be required for work in the proximity of the high-voltage line referred to in #2. This inspection will be provided by the City at the contractor's expense.

4) As noted in item #15 of the Barron Park Associations's letter to you of January 19, 1988, vegetation should be replaced in kind or better wherever appropriate. This replacement should take place in the same year as construction wherever possible.

5) Page 59: The Water District plans to build an 8' wide bench and ramps on the north bank under the Highway 101 bridge for a future pedestrian pathway. The Caltrans Design Standards for two-way bike paths require that a minimum of 8' of horizontal clearance be provided between railings on Class I two-way bike paths. We recommend therefore that the width of

the bench be increased to 9' wide or greater so that if a railing is installed for a future pathway, the undercrossing's horizontal clearance would be acceptable. The Water District should indicate the required distance from the edge of the ledge to the footings for the railing (based on it's standard for other similar installations), and adjust the width of the ledge accordingly.

6) Page 63: The SCVWD indicates that the roadway profile at the Greer Road bridge will not be "significantly" changed but that curbs and gutters will be raised by one foot. The SCVWD should ensure that the proposed modifications to the curb and gutter do not have a negative impact on sight distance. This comment is applicable to all situations where changes in existing road grades are proposed.

7) Page 76: The proposed road grade raising of Park Blvd. must conform to Caltrans design criteria as well as City of Palo Alto requirements.

8) Page 84: The construction of the bypass channel will result in the temporary loss of 150 parking spaces in the Varian parking lot. The SCVWD should detail how this loss of parking spaces will be mitigated and what the impact will be on surrounding public streets.

9) Page 86: Due to the environmental impact (loss of vegetation) related to the construction of a temporary bike path detour within the Southern Pacific Railroad right-of-way along Reach 8B, the SCVWD should further explore all other reasonable and convenient alternative detour plans including acquisition of a temporary easement from adjacent private properties to construct a parallel bike path detour that would connect to the section of the Varian path which connects to Hanover Street. The traffic along this Reach 8B is in excess of 400 bikes/pedestrians per day; of these users over 100 are elementary through high school age students. Closure of the path, given these traffic counts, is not acceptable.

The schedule of the construction along Reach 8B should coincide with the summer vacation schedule for PAUSD students (i.e., mid-June to Sept. 1).

10) Page 92: The proposed detour bike path alignment across Gunn High property between the City bike path and school path is not mentioned. Further, the existing Gunn High path must be upgraded to minimum standards for two-way bike paths.

11) Page N-41: The report indicates that "approximately 30 trees and 185 shrubs" would be removed from Reach 8B due to the combination of excavation/construction of the underground bypass and construction of the temporary bike path. The report should indicate what loss of vegetation is attributable to the bypass project alone, and what is attributable to the temporary bike path.

12) Our comments sent to you in a letter dated August 28, 1987 regarding this project still apply.

Please feel free to call me if you have any questions regarding these comments.

Sincerely,

Dave Matson

Dave Matson
Associate Engineer

DM:sr

cc: George Bagdon
Jim Harrington
Gayle Likens
Bob Haley

County of Santa Clara
California

Transportation Agency
1555 Berger Drive
San Jose, California 95112

1/28 BHG
SNW
KES
KRT
KWW

January 26, 1988

Dr. Bernie Goldner
Environmental Specialist
Project Development Branch
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

SUBJECT: Foothill Expressway
Matadero and Barron Creeks Planning Study
Engineer's Report and Draft Negative Declaration

Dear Dr. Goldner:

We have received your December 18, 1987 letter along with a copy of the "Matadero and Barron Creeks Planning Study (Palo Alto Flood Basin to Foothill Expressway,") consisting of an Engineer's Report and Draft Negative Declaration dated December 1987.

You have asked that if we have any comments, that we submit them in writing by January 28, 1988.

We have the following comments:

1. Page 63: The last paragraph should state that replacing the existing culvert on Middlefield Road at Matadero Creek may require relocation, at least temporarily, of two existing bus stops that are adjacent to the existing culvert. Please call Mr. Ron Wong at 299-4384 two weeks before construction is scheduled so that the bus stop signs and benches can be relocated, if neccessary.

2. Appendix N, Page N-46: The third paragraph should state that a number of County Transit bus lines will be affected by the proposed detours and lane closures during the bridge construction. Please specify a minimum lane width of 12 feet for all lanes that are to be kept open on streets used by County Transit buses. Please see the enclosed copy of the "Santa Clara County Transit System Map," effective October 1987 through April 1988 for details on the bus lines that operate in the project area. Please notify Ms. Jerri Cooper at 299-4901 or Ms. Shandra Robbins at 299-4384 of any proposed road closures, detours, and lane closures at least 2 weeks before construction begins so that we can schedule rerouting.

An Equal Opportunity Employer

3. Plate 18: A review of Sheet 18 ("Plate 18") of the "Map and Construction Plan" for the project following Appendix N of the planning study indicates that the end of the project is south of Foothill Expressway at Station 303+55. However, the plan does not indicate whether work is proposed within the Foothill Expressway right-of-way. If any work is proposed within the Foothill Expressway right-of-way, please submit a plan of the work along with a request for an encroachment permit for our review.

Please contact me at 299-4205 if you have any questions.

Thank you for allowing us to comment on this project.

Sincerely,

Don Bugni

DON BUGNI
Associate Transportation Engineer

DB:ei

Attachment

cc: Jerri Cooper, Bus Operations
Shandra Robbins, Bus Operations
TAC
RKW
RGH

Lands Management

Stanford University
105 Encina Hall
Stanford, California 94305-6080
Telephone (415) 725-6886

1/25
same to: RRT
BHG
SNW
RRS
KWW

January 21, 1988

Mr. Randall Talley
Mr. Bernie Goldner
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

RE: Stanford University response to Matadero and Barron Creeks Planning Study consisting of Engineer's Report and Draft Negative Declaration dated December 1987.

Dear Randy and Bernie:

I write this letter to advise you that, as we discussed during the week of January 18, 1988, Stanford will submit its formal written response to the above document no later than February 19, 1988. We appreciate the District's concession in this regard since we are unable to submit our response by the January 28, 1988, deadline cited in your document's December 18, 1987, cover letter. We did not receive the document until December 28, 1987, and are unable to meet the January 28 timeframe given the holiday season timing and the nature of our responses. You indicated that a formal time extension was unnecessary and that the District would give the same consideration to our post-January response that is accorded those received before the deadline.

I will take this opportunity to raise several of the issues Stanford has identified for response to the subject document. This listing is not meant to be comprehensive in either number of issues raised or level of specific detail; our intent is to alert the District at this earlier occasion of many of our concerns.

* TOXIC CONTAMINATION (Reference Appendix L)

We are concerned that the potential of encountering contaminated groundwater or soils in the construction zone is serious enough to warrant a more detailed treatment of the "contingency plan" section of Appendix L. As mentioned in the "Data" section on page L-2, the document states that "special measures may be required"; these measures can be at least roughly outlined with the assistance of the appropriate agencies (e.g. State Department of Health Services and Regional Water Quality Control Board). We would like the document to specifically address the following: (1) the procedures which would be required by these agencies should contaminated soil or groundwater be encountered; (2) the procedures which would be followed to avoid or remedy the migration of nearby contaminated plumes, should groundwater pumping result in such a migration; (3) the types of permits, if any (e.g. NPDES), which would be necessary for disposing of contaminated materials; (4) the related time delays which could result from any of the above; and (5) the scope of pre-excavation soil and groundwater testing is contemplated. The legal and economic aspects are critical to the project (i.e. who will be responsible for the discharge or disposal of any contaminated materials) as they can significantly impede the progress of this project. We believe these aspects should be addressed in more detail at this stage to avoid or minimize future delays.

EIA Checklist, Pg. N-4
Add 1 H. Excavation of contaminated soils? (answer = maybe during construction.)

* ARCHEOLOGY

Stanford's archeologist, Barb Bocek, has communicated with the District archeologist on some of our concerns. We will require continuous monitoring by our archeologist or her designated representative in all areas of excavation deemed to warrant such attention. Sporadic monitoring may be required in less sensitive areas. Generally speaking, the closer to a creekbank, the more sensitive the area. Monitoring charges will be payable by the District and are in the range of \$8-\$10 per hour for the "designated representative"; there is no charge for the archeologist's time. The monitor has the power to stop the excavation to investigate possible finds and to remove and preserve same. Any artifacts discovered remain the property of Stanford.

There is a recently recorded archeological site (Indian Village) at the intersection of Matadero Creek and the existing city bike path. This is not Stanford property, but we urge that special care be taken in this very sensitive area. The design concessions that the District has already made in this regard, including the deletion of the proposed access ramp, is indeed appreciated.

* EASEMENTS ALONG MATADERO CREEK BETWEEN FOOTHILL AND HILLVIEW

We seek clarification that the District will be solely responsible for flood control and erosion maintenance in this area after the granting of the requested easements.

* NOTICE TO AFFECTED STANFORD LESSEES

We request that the District undertake to specifically notify Stanford lessees who will need to co-sign the subject easements for this project. Those lessees will need to fully understand the nature, scope, and significance of this project and the District needs to bear this burden. Initial review indicates that the following lessees are included in the category: Varian, Watkins-Johnson, Syntex, Harry Fair, Foothills Tennis and Swimming Club, University Club, Matadero Creek Properties, Coherent, and HIACO.

* EASEMENT DRAFTING, CHANGES, AND CONSIDERATION

Stanford has a policy of charging for easement production and processing costs. The flat fee for each easement will be $750; each lessee affected needs to review and sign the easement associated with its respective parcel and, as such, "each easement" means one per lessee.

Stanford requests that we generate the easement document language and then submit the same for the District's review and subsequently for the affected lessee's review. We ask that the District forward to me as soon as possible one or more "standard" or "facsimile" easements containing the language the District would like to include in such documents. Our goal is to implement and complete this easement drafting and language negotiation process as quickly as possible. Experience indicates that such documents can take many months to complete.

Concerning the issue of Stanford requiring consideration for the subject easement grants, our policy is to charge the grantee a reasonable sum. We are assessing this policy with regard to this project.

As a final note, this project will require some new easements and the amending of some existing ones.

* VARIAN PARKING LOT EASEMENT

Stanford is considering the requested detour of the Matadero Bypass channel into the Varian parking lot. We are aware that Varian basically approves of this alternative. All appearances indicate that we too will approve this parking lot section which is an accommodation to the neighboring Barron Park Association's request.

Randy and Bernie, thank you for your consideration and attention to the above. The District's cooperation and professionalism in much appreciated.

Very truly yours,

Kirt Pruyn /CQG

Kirt Pruyn
Lands Manager

WKP:cqg

cc: Barb Bocek, Stanford Anthropology
Paula Kakimoto, Stanford Lands Management
Zera Murphy, Stanford Lands Management
Stanford Legal Office

Varian / 611 Hansen Way / P.O. Box 10800 / Palo Alto / California 94303-0883 U.S.A.
Tel. (415) 493-4000
Telex 348476
varian

2/19- KWW
KLT
SNW
EHG
SAP (JL)
JTD

February 12, 1988

Mr. Keith Witman
Engineer
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

Dear Mr. Witman

Varian periodically conducts meetings with the residents of the Barron Park residential neighborhood which is adjacent to Varian's Hansen Way Site. The purpose of the meetings is to keep the residents informed of activities in Varian's portion of the Stanford Research Park and to give the residents of Barron Park the opportunity to have their concerns heard by Varian management.

You or a member of your staff are invited to attend a meeting with the residents of Barron Park residential community. The meeting has been scheduled for February 24th at 7:30 PM in Varian's Building 7 Auditorium on Hansen Way, Palo Alto. Suggested agenda for the meeting is as follows:

Varian's Noise Control Efforts
California Safe Drinking Water Law (Prop. 65)
Santa Clara Valley Water District's Flood Control Project
Building 5 Project Schedule

The length of the meeting is anticipated to be two hours with ample opportunity for comments from the participants.

Sincerely,

Carl Clemm
Director of Facilities
Varian Associates

7018 '88 FEB 19 AM 1:53

WATKINS-JOHNSON COMPANY

3333 HILLVIEW AVENUE
STANFORD INDUSTRIAL PARK
PALO ALTO, CALIFORNIA 94304

VICE PRESIDENT

1/25 BHG
SNW
RRS
RRT
KWW

January 21, 1988

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Attention: Dr. Bernie Goldner

Reference: Matadero and Barron Creeks Planning Study dated 12/87

Dear Dr. Goldner:

I have reviewed the referenced study which proposes to excavate and construct an additional 700 foot long box culvert parallel to the existing box culvert which crosses our site. Two major concerns arise regarding this construction activity and its potential for negatively affecting our operations. These relate to dust contamination of our manufacturing processes and on-site traffic interruption resulting from trenching of both driveways and pedestrian walkways.

Due to the sensitive nature of our products and their susceptibility to dust contamination, we filter all outside air and in many cases, we further process the air for clean room environments where the presence of particulates would be especially threatening to our processes. If excessive amounts of dust are raised by the construction, our air filters could become clogged and degrade the quality of air flowing into the buildings with serious implications for our products.

Operational efficiency requires safe unimpeded vehicular and pedestrian traffic flow between the six buildings on our site due to the interaction of our manufacturing activities and supporting services which are located throughout our facility.

I believe the above issues are not incompatible with the proposed construction if mitigation efforts are established. By this letter I am requesting that identification of appropriate mitigation efforts be coordinated with Watkins-Johnson Company and incorporated into any contract awarded for the Reach 10 construction.

Very truly yours,

Keith D. Gilbert
Vice President
Devices Group

dlf

BARRON PARK ASSOCIATION
PALO ALTO, CALIFORNIA

Mr. John T. O'Halloran   Mr. Robert R. Smith   January 19, 1988
General Manager   Flood Control Manager
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear John and Bob:

The Barron Park Association Board of Directors and the Barron Park Association Creek Committee has reviewed, in detail, the MATADERO AND BARRON CREEKS PLANNING STUDY CONSISTING OF ENGINEER'S REPORT AND DRAFT NEGATIVE DECLARATION dated December 1987.

The Barron Park Association supported Measure F, and now endores the general concepts of the Matadero and Barron Creek flood control proposal as recommended in the above said report.

There are, however, some aspects of the proposed flood control project which are either inadequately addressed and/or unsatisfactory as proposed.

For your review and consideration, we have attached two key appendices:

I. COMMENTS ON THE MATADERO & BARRON CREEK PLANNING STUDY, DEC. 1987
This is a six page discussion of our concerns with the proposed project. We have listed 22 points that we consider important enough for us to mutually resolve BEFORE the January 28, 1988 end of public input.

II. DOCUMENTATION OF BPA AND NEIGHBORHOOD INVOLVEMENT TO ADDRESS FLOOD CONTROL PROBLEMS
This is a very large collection of BPA document including: BPA Board Minutes, BPA Creek Committee Minutes, Public testimony, correspondences, newspaper articles, BPA application for a flood control warning system, public meetings, BPA Creek cleanout projects, and similar community involvement.

Sincerely,

THE BOARD OF DIRECTORS OF THE BARRON PARK ASSOCIATION

Clara Sharpless
Janet Dingler
Bob Moss
Katie Edwa

cc: Barron Park Association Board of Directors
Mayor Sutorius and the Palo Alto City Council

Pg 1 of 6

Comments on the Matadero & Barron Creek Planning Study, Dec. 1987

The Barron Park Association and the BPA Creek Committee are delighted to acknowledge the efforts made by the SCVWD to solve the problem of potential flooding from Matadero and Barron Creeks. Barron Park has been subject to flooding from both of these creeks for many years. Substantial damage and loss of property has occured and been documented. The worst recent event was Jan. 1983 when damages exceeding $120,000 was reported in a survey by the BPA Creek Committee. Our active participation with SCVWD in this process extends back more than 15 years. Our objectives included eliminating flooding, minimizing adverse environmental damage, and retaining the natural creekbeds. The attached appendices describe past flooding problems and our work with SCVWD, the City of Palo Alto, Army Corp of Engineers, and others in an attempt to eliminate this hazard.

The Nov. 1986 passage of the Measure F tax benefit assessment with more than 72% yes votes makes it possible to accelerate construction of flood control improvements from 2015 to 1988-92. The BPA supported Measure F, and endorses the general concept of the Matadero and Barron Creek flood control measures. However, there are some aspects of the proposed Project which either are inadequately discussed or are unsatisfactory as proposed. These issues are discussed below, and recommendations for corrective action are given.

There have been 5 meetings between SCVWD and Barron Park residents regarding this project: a small meeting in early April 1987 between SCVWD staff and officers of the BPA, a presentation by SCVWD staff engineers to the BPA Board in July, 1987, and 3 public hearings, May 27, June 9 and Sept. 14. The latter 2 meetings were held in response to requests by the BPA. At each of these meetings the SCVWD described the proposed project, and residents provided comments and suggestions on how to improve the plans, and reduce adverse impacts. The SCVWD staff and Directors have been very helpful and cooperative in listening to our concerns and attempting to respond positively to them. We appreciate this cooperation and offer our comments on the December 1987 Planning Study and Draft Negative Declaration in a continuing constructive spirit.

The BPA Creek Committee met Jan. 7, 1988 to review the Planning Study. There were 14 people in attendance from both the Matadero and Barron Creek watersheds. After reviewing the SCVWD Report and Draft Negative Declaration we noted several issues which need clarification, or are not adequately treated. In addition, we would like to suggest modifications which will improve the project and reduce adverse impacts. These suggestions and proposals were reviewed by the Board of Directors of the BPA on Jan. 19. The comments made below are those adopted by the BPA Board based on the findings and recommendations of the BPA Creek Committee.

Pg 2 of 6

1. We find the basic concept of joining overflow from Barron Creek with Matadero Creek to be innovative and effective. It will solve the flooding problems on both creeks while reducing costs and significantly reducing the number of streets and bridges which must be torn up and rebuilt. It also significantly shortens total construction time. If properly done this approach should reduce adverse environmental impacts, and provide a functionally acceptable solution.

2. The design flow capacity of Matadero Creek is given as 1300 cfs at Bol Park (P. 87), and 3000 cfs at El Camino Real (P. 77) when the open creek flow is joined by the 1700 cfs from the box culvert. Total flow from Stanford is taken as 200 cfs. Does this 200 cfs include the added runoff from Stanford which will occur as a result of the new bulding which already is occurring and which is planned in the Matadero Creek watershed? What is the present flow in the Stanford Ditch as it enters Matadero Creek? Is SCVWD aware that Stanford stated in the July 1986 Land Use Permit Modification EIR that they plan to build structures and pavement covering more than 1.1 million sq. ft., or over 25 acres in the Matadero Creek watershed by 2000? How much added runoff will this impervious cover cause during a 100-year event? Will the planned channel carry this added flow without flooding? Please address the actual and future flow into Matadero Creek from upstream development and demonstrate that the new culvert and downstream floodwalls and bridge enlargement will handle runoff from this new development.

3. The flow capacity of Barron Creek is given as 180 cfs on P. J-1. In the past SCVWD stated that the flow capacity at Laguna Ave. was 210 cfs. Which is correct? Does the predicted peak flow of 760 cfs take into account added runoff from future upstream development and addition of impervious ground cover? How much future development was factored into the flow estimates? Please show that the 600 cfs diversion culvert will be adequate to prevent flooding from Barron Creek in a 1% event even with added runoff from future upstream development.

4. There is no statement in the Planning Study about how water flow from Stanford will be carried during construction in reaches 7B and 8B. When those reaches are under construction portions of the existing 84" Stanford pipe will be nonfunctional. Will there be a temporary bypass pipe, pumps, or some combination? Where would any bypass run? We urge that if a temporary bypass is used that it not go in the right-of-way behind the homes on Chimalus if at all possible.

Pg 3 of 6

5. Figure G-1 shows Matadero/Barron Creek flow peaks at 3500 cfs at the flood basin. Would either the flow rate or the water depth in the flood basin be increased if future upstream development on Stanford lands covers 25 acres or more with impervious paving and buildings? Could simultaneous high flows from Barron and Adobe creeks cause Matadero Creek to back up due to inadequate Flood Basin or creek flow capacity? Please show how and when this total system capacity was evaluated, and demonstrate that it is adequate.

6. On P. 87 the statement is made that normal flows above 350 cfs will be diverted from the Matadero creekbed thru the 12x12 foot culvert. It also says that at 1% conditions 1300 cfs will flow down the creek with 900 cfs diverted thru the culvert. Is the added 950 cfs flowing down Matadero Creek entirely from higher flow rates during 1% storms, or is there a change in the diversion efficiency? The statement also is made on P. 88 that water from Matadero Creek will enter the bypass channel before diverted flow from Barron Creek enters Matadero Creek. The present design does not put water from Barron creek into Matadero Creek, but into the diversion culvert. Since the 2 creeks have different watersheds, how can it be assured that Barron Creek will not have a diverted flow before Matadero Creek? If Barron creek diversion flow occurs first, will that affect the Matadero Creek overflow diversion?

7. On P. 92 & P. N-42 it is stated that the Barron Creek bypass culvert construction will remove trees and shrubs, but the only mitigation is grass reseeding, and on P. N-42 that no mitigation is required. This is unacceptable. Any trees and shrubs which are removed must be replaced at least 1 for 1. We have a serious concern that the Planning Study does not make a committment to minimize removal of vegitation and to replace any removed or damaged vegitation with equivalent plantings. Terms such as "will be considered" and "should be planted" are used rather than clear and unambiguious commitments. Such terms must be removed and replaced by positive committments to provide full replacement and enhancement of all trees and bushes. It is important that the verbal expressions of concern made by staff and Board members be made clear and firm in the written documents. If this is not done, we fear that when the RFP and bidding packages are prepared in several years people will have forgotten the present assurances, or there will be new people involved who did not participate in the current reviews and discussions.

Pg 4 of 6

8. SCVWD expects to maintain the open reach of Barron Creek by obtaining easements, and working from Los Robles per P. 54 & 100. In the past most property owners on Barron Creek have refused to grant easements. SCVWD policy is not to accept easements on part or scattered sections of a creek. Will easements be required from all property owners, or will SCVWD accept easements from a portion of them? What will the impact be if no or incomplete easements are obtained and SCVWD is unable to clean or devegatate the creek?

9. The safe flow for Matadero Creek is given on P. 92 as 1300 cfs at Bol Park. Hasn't Matadero Creek actually carried over 1500 cfs without flooding in the past?

10. The discussion of adverse impacts along Reach 7B between Varian and the homes on Chimalus is incomplete. Assurances must be given that every effort will be taken to preserve trees, especially the larger ones. Construction along this section should be accelerated, to minimize the time that residents will be impacted. If the Varian sound wall is removed to facilitate construction, it should be replaced as soon as possible. Hours of construction should be adjusted to minimize adverse impacts on the neighbors, and loud noises and disturbance should be avoided as much as possible. In no instance should construction hours and noise be in violation of the Palo Alto Noise Ordinance. Construction should not begin before 8AM weekdays, 9AM Saturdays and 10AM Sundays.

11. We also ask that equipment and supplies be stored at the front of the Varian parking lot between Varian Building 1C and El Camino Real. Access to the easement behind Chimalus should be from the El Camino end. A temporary fence should be erected across the easement at the Kramer and Witt homes (see maps 12B and 13B), to prevent casual access to the area behind the homes during construction.

12. Some residents on Chimalus asked that the project also eliminate the local drainage from the easement into backyards which is due to the existing 84" pipe and berm. SCVWD agreed to do this by installing a surface V ditch (P. 83). Will there be any local drains into the bypass culvert in reaches 7B, 8B or 9B? We urge that any drains have 1-way valves to prevent water from being forced back up the drainage laterals onto adjacent property. Residents along Chimalus who live adjacent to the area where the bypass culvert will be in the Varian parking lot beyond the sound wall expressed a desire not to have surface drains running into the culvert near them because of fear that high flows in the culvert will force water up the laterals onto their property. What adverse impacts may occur from lowering the sanitary sewer shown on Map 12B? How many properties would be affected? How can any adverse impacts be mitigated?

Pg 5 of 6

13. Reach 8B, the bike path and SPRR right-of-way, would be essentially devegitated to accomodate a parallell bypass bike path during construction (N-41,42). We find the loss of some 30 trees and 185 shrubs covering 20,000 sq. ft. to be excessive and unnecessary. The estimate that the denuded area will require at least 2 years to recover probably is very optimistic. We strongly recommend that the bike path be closed temporarily in this section, and that construction be accelerated. Alternate bike routes exist along Miranda and Hillview, or via Matadero to El Camino Real, then north to Hansen. Please note that on P. K-1 and Map 19there is reference to detouring the bike path via an existing gate to McGregor Way. Please be informed that the gate and paved area is a private driveway, not a public right-of-way. An easement exists for school district uses, but not for necessarily the proposed bypass. Please contact Larry and Trina Lovercheck, 1070 McGregor Way about use of this gate and driveway.

14. Along Reach 9B there will be loss of at least 7 trees, but mitigations on P. N-42 mentions replanting with groundcover only. Replanting must include at least as many trees of similar size as are removed during construction.

15. In the past SCVWD practice has been to wait 1 or 2 years after completion of a construction project before re-landscaping. Because the bypass culvert will pass thru a park and close to many homes, it is unacceptable to wait so long before replanting. Therefore we ask that replacement plantings begin in the same year that construction is completed. It should be stated explicitly that irrigation systems will be provided and maintained at least until all new trees and shrubs are 3 or 4 years old.

17. On P. 77 it is noted that 2 property owners who have refused to grant maintainance easements will be asked to grant them. Who are the property owners, and what will the impact be if they continue to refuse? How extensive would the maintainance be?

18. Reach 10 will have a new box culvert installed at Watkins Johnson, requiring a wider right-of-way (P. 89). Please provide more details on the bypass culvert at Watkins Johnson shown on Map 16. Will this culvert provide adequate flow in Matadero Creek at the bridge just downstream of Hillview? Map 15 shows the proposed new right-of-way includes an occupied cottage on the Glover property. Will this cottage be disturbed or damaged in any way by acquisition of the right-of-way and construction of the culvert? If so, what mitigations are proposed? Map 15 also shows the inlet diversion structure is rather close to the Bol house. Will there be any disturbance or damage to the Bol house from construction of the diversion culvert or other construction? Who owns and maintains the critical silting basin in Reach 10 (P. 99)?

Pg 6 of 6

19. Map 19, Barron diversion channel, appears to show the culvert passing thru rather than around Strawberry Hill. This hill is visable near the map fold below "Gunn High School". The culvert should be bent or rerouted in this area so that no excavation and rebuilding of the hill is required. The elevations shown on Map 19 are incorrect; Sta. 12.50 should show a hill, not a steady decline in elevation.

20. How will the Hetch-Hetchy pipeline be protected during construction (P. 91)? Damage to this water line will have severe adverse impacts on water service from Los Altos to San Francisco.

21. Reach 11 near Watkins-Johnson passes 3 known toxic spill sites, and as many as 7 other toxic spills are suspected in this watershed. Pollutants from spills have been found in Matadero Creek. What actions and precautions will be taken to avoid spreading the pollutants and preventing additional spills into the creek? Will there be any monitoring to assure that no future spills occur and contaminate Matadero Creek (P.1-2)?

22. There have been some concerns raised by residents about the proposed project, particularly in regard to loss of vegitation, disturbance during construction, poor drainage from the existing culvert berm, and lack of a formal means of effectively registering concerns and complaints. The BPA requests that a laison group be established to act as a focal point for bringing residents concerns and complaints to the attention of appropriate SCVWD personnel, and to inform residents of activities and plans for construction. The most logical organization is the Creek Committee of the BPA, in conjunction with the entire BPA Board. The BPA Creek Committee Chairman, President of the BPA, and our local representative on the NW Flood Control Advisory Board would be permanent members of the Committee with residents serving on an ad-hoc basis in response to construction or other activities which may impact them. In addition, the Hazardous Materials Coordinating Committee should be informed of the project and the possable spread of contaminated soil and groundwater during construction.

Finally, these issues shouold be addressed and resolved before the Jan. 28, 1988 close of public comment to assure the community that the project will address sucessfully these various issues.

Yours very sincerely,

Bob Moss

Bob Moss
Creek Committee Chairman

John Joynt
BPA President

12/29 SAP (Bd)
RRS
SNW
RRT
KWW
BNG
JTO
ATN?

488 James Rd
Palo Alto, CA 94306
12-26-87

Dear S.C. Valley H_2O District, Board;

I strongly protest and I am opposed to the proposed "flood control project on Matadero and Barron Creeks" (pls. see attached).

My property at 488 James Rd. has not in any way had the least problem with flooding (last 10 years) and I definitely do not want to pay for this proposed work!

Please submit this comment - statement to the Board of Directors for this hearing, Thank you.

Joyce Karst
(415) 424-1369

12/24

RRS
RET
KWW

December 22, 1987

Robert R. Smith
Santa Clara Valley Water District

Dear Mr. Smith:

I have reviewed the "feasible alternatives" for the proposed Matadero and Barron Creek flood control projects and wish to file a written protest against all the alternatives. The project is unnecessary. The only action necessary is to continue the periodic clearing of trash and obstructing vegetation from the stream channels.

Sincerely,

Allan L. Coleman
923 Shauna Lane
Palo Alto, CA 94306

(12/29-RRS w/a
SNW "
RRT "
KWW "
BHG "

410 Sheridan #452
Palo Alto 94306
Dec 27, 1987

Santa Clara Valley Water District

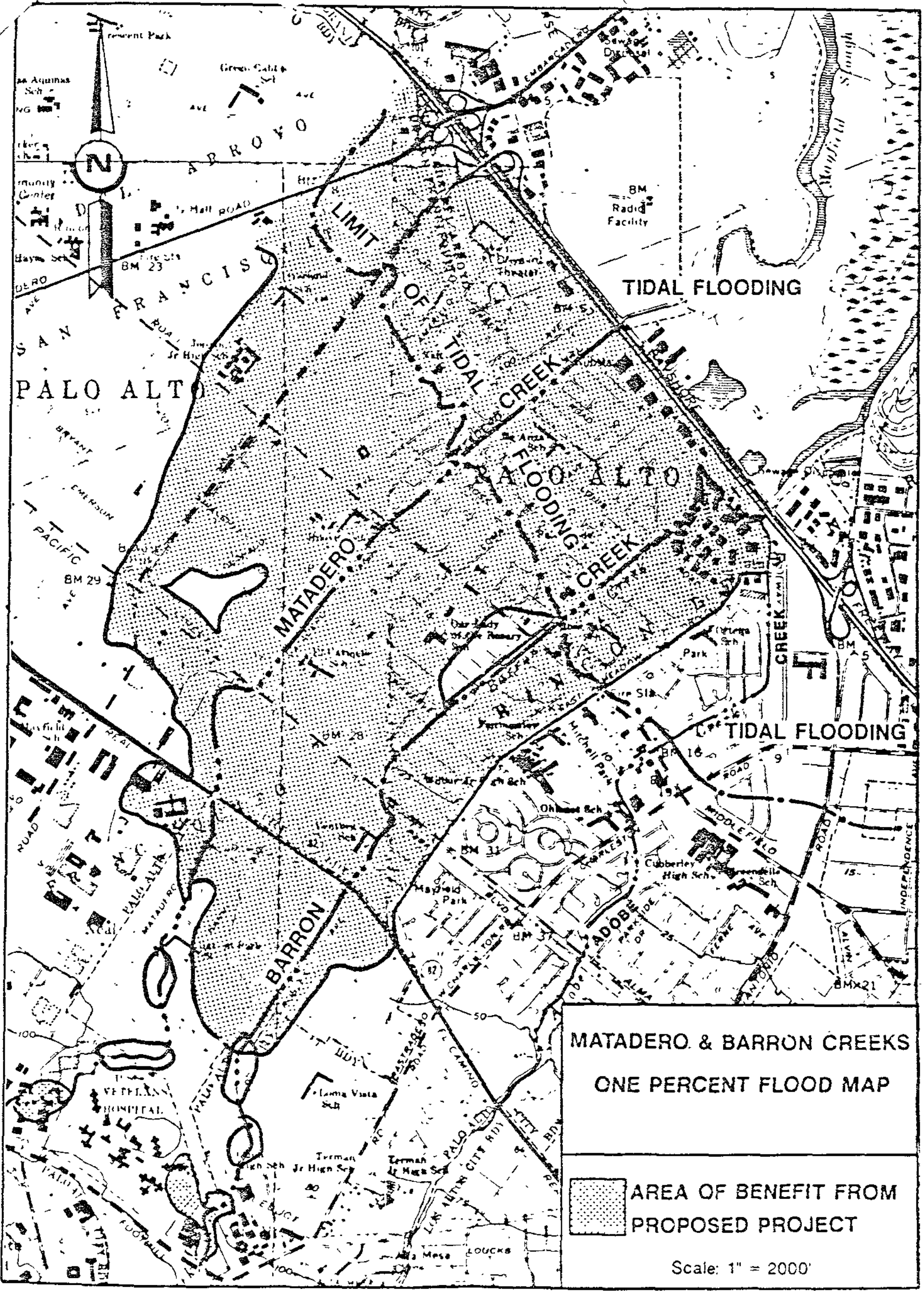
Dear Robert R Smith

Matadero + Barron Creeks

All of the alternatives in your Dec 21 letter are WRONG! The environmentally correct solution is to catch the rain upstream and to return the water to the underground water lens through percolation ponds. Something like on your marked up map enclosed.

Please go back to the drawing board!

Herbert R Foster



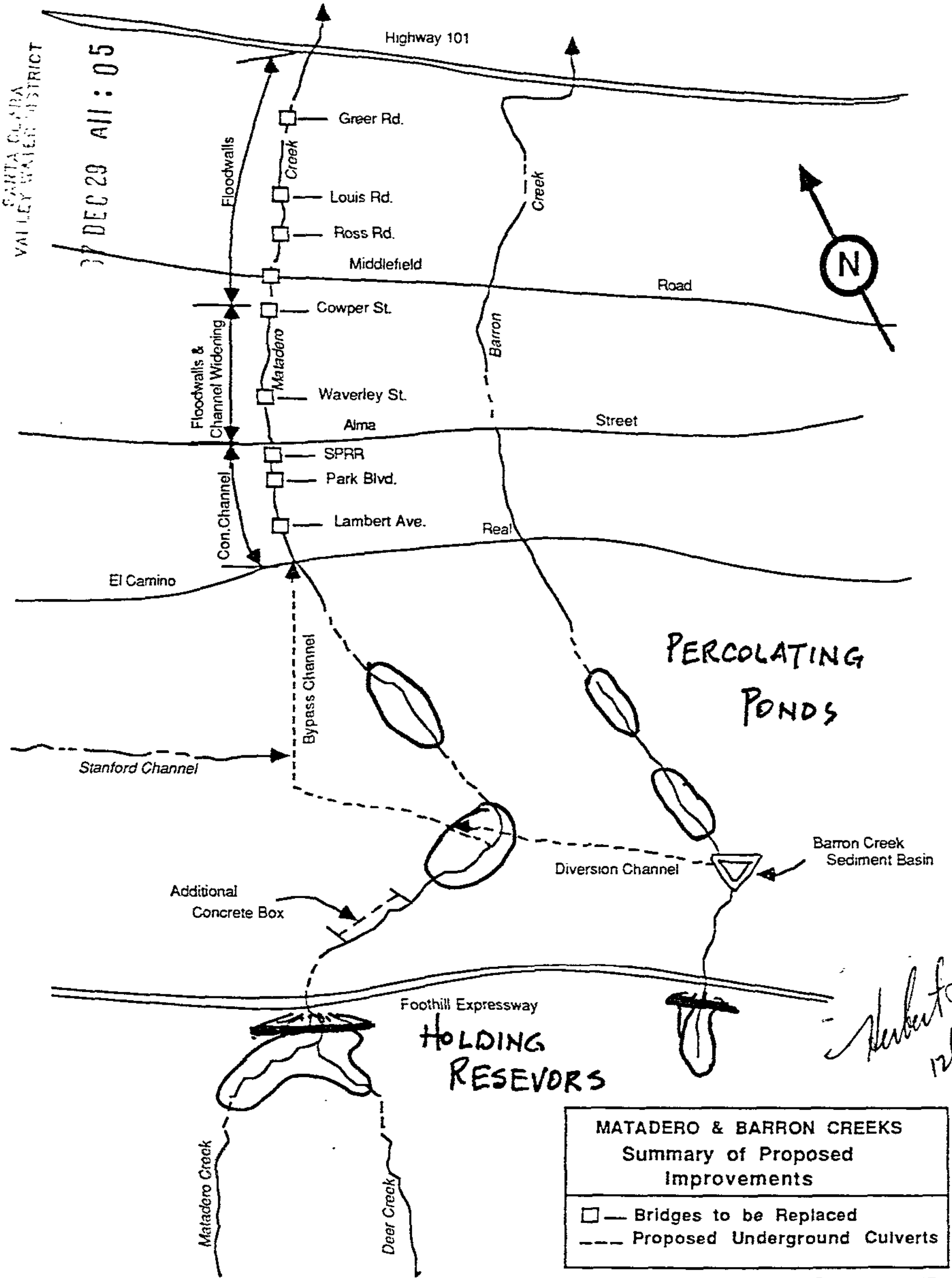
MATADERO & BARRON CREEKS ONE PERCENT FLOOD MAP

▨ AREA OF BENEFIT FROM PROPOSED PROJECT

Scale: 1" = 2000'

PALO ALTO FLOOD BASIN

SANTA CLARA VALLEY WATER DISTRICT
87 DEC 29 A11:05



Herbert Foster
12/27/87

December 1987

1/7-RRS
DFK
UTO

JOHN A. BYRNE
3702 REDWOOD CIRCLE
PALO ALTO
CALIFORNIA 94306

3 January 1988

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118

I wish to express disapproval of the proposed improvements to Matadero and Barron Creeks as described in the enclosures to the District's letter of 21 December 1988.

I am not persuaded on the inevitability of the 1-percent (or 100-year) flood and the estimated $28 million in damages that would result therefrom. Additionally, if the proposed improvements are constructed at a cost of $20.6 million, who is to say that a 0.4-percent (or 250-year) flood coinciding with a significantly higher-than-average tide on the bay would not swamp the system? Nature is invariably on the side of the hidden flaw.

A better approach might be to spend $20.6 million to convert uplands to open space, thereby precluding their being covered with acres of rooftops, driveways, tennis courts, and new and "improved" roads, etc., all of which are 100-percent nonabsorbant and therefore guaranteed contributors to the flows that Matadero and Barron Creeks must carry.

Let me also express concern over decreasing maintenance of existing facilities. I believe that in years past the District cleaned its channels--or at lease Adobe Creek near my residence--every year of its accumulations of rocks, sediment, grocery carts, and the like. I note that this channel has not received such attention of late, witness (in addition to a fair amount of trash) weeds growing in the dirt at the bottom of the channel and what appears to be a small (four or five foot) tree growing out of a crack in the channel wall near Charleston Road.

Let's not be in a rush to solve all our difficulties by pouring concrete. There may be other answers.

Sarah T. Byrne

1/19-RRS
SNW
RET
KWW
RHG

January 14, 1988.

Mr. Robert R. Smith
Flood Control Manager
5750 Almaden Expressway
San Jose, California 95118

Reference: Proposed flood control project on Matadero and Barron Creeks.

Dear Sir:

We would appreciate consideration being given to removing the existing bridges that span Barron Creek on Ramona and South Court Streets and making the existing bridge spanning Bryant Street into a "bicycle and pedestrian only" crossover. This would make the crossings of Barron Creek consistent with those of its neighbor, Matadero Creek. This modification would serve to reduce the number of places where the creek can become obstructed and produce flooding. This modification would also allow extending the existing Bryant Street bycycle right-of-way down to East Meadow, which is a street so many school children use.

Thank you for your consideration.

Sincerely,

George E. Falkenthal
George E. Falkenthal
Eileen A. Falkenthal
Eileen A. Falkenthal
3338 Ramona Street
Palo Alto, CA 94306

SNW
KKT
KWW
BHG

23 JAN 88

Dear Mr. Smith:

I want to register my concern about the proposed design of the Matadero Creek flood control project. In particular, for the region of the creek between El Camino Real & Alma Street where a new concrete channel is slated to be constructed, I want to urge you in the design to view the creek as an asset to the area and to provide for some landscaping other than the usual chain link fence. This area is slated for future residential development, and a psuedo-creek (one in a carefully designed concrete channel) with an element of riparian vegetation could be a big plus.

Doug Hohbach

204 Sheridan Ave
Palo Alto, CA 94306

January 26, 1988
Page 1 of 2
K. Kresie

Mr. Keith Whitman
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, Ca. 95118

1/27 KWW
RRT
BHG
SNW
RRS

Hello Mr. Whitman:

I attended the public hearing on the Barron and Matadero Creek Project proposal that was held the evening of January 20th at Walter Hays School in Palo Alto. At that time I submitted several questions and comments in writing and had the opportunity to ask a couple of follow-up questions. I presume you have a record of those questions and comments. After some reflection, I find that I still have some unanswered concerns about the project.

My main concern is that the Matadero Creek high-flow "bypass channel" and the Barron Creek high-flow "diversion channel" (buried RCB culverts) will deliver their designed flood protection only if they are properly maintained. In reading the Engineer's Report and during the presentation you gave at the January 20th hearing, I was not able to get much information about the methods SCVWD plans to use to maintain these two underground channels. At the hearing, Mr. Robert Smith indicated that SCVWD has experience with underground channels because it is also a water provider. However, he did not describe the methods SCVWD proposes to use for inspecting and cleaning (as needed) the particular channels being proposed.

Because these underground channels are long and underground they will be impossible (?) for nearby residents to monitor and therefore we apparently must depend completely upon SCVWD inspection and maintenance to keep them ready to function according to design. Furthermore, since these channels are designed to carry water only during high flow events, there will be no warning (e.g. obstruction of low flows) if either of the channels is blocked to an extent that would raise the level in the Gunn High settling basin or the Matadero Creek upstream from El Camino, with consequent flooding of portions of Barron Park.

I believe the Matadero Creek bypass channel and the Barron Creek diversion channel are fragile concepts that will work as designed only if a level of inspection and maintenande is applied to them that is far greater than given to the open-top channels maintained by SCVWD. In reading the Engineer's Report for this project, I did not see any statements recognizing the additional maintenance burden these long underground channels represent.

1. Does SCVWD recognize the increased maintenance burden these proposed underground channels represent ?

2. Were the future maintenace costs of the project alternatives expressed in "present value" form for comparing the costs of those alternatives ?

(continued on Page 2)

3. Is SCVWD committed to delivery of whatever maintenance is required to convince Barron Park residents that these channels will work as designed when the need "arises" ?

4. What methods will SCVWD use to inspect and clean the two underground channels being proposed ? How frequently will inspections be done ?

I think a satisfactory maintenance plan would include at least one inspection per month in the months November, December, January and February, plus an additional inspection after each occasion when either channel carries water (and perhaps debris). Some of this concern about inspection could be reduced if the inlet of each channel was guarded by some sort of easily-cleaned coarse screen (e.g. 1" rods used in a grid having 12" spacing).

5. How about some sort of self-cleaning screens on the channel inlets ?

6. What experience does SCVWD have in maintaining underground channels of similar cross section (10-12' wide x 6-10' high) and length (2000-4400') ?

7. Would making the Barron Creek diversion channel 8' high rather than the proposed 6' high allow maintenance costs to be reduced to an extent that would justify the additional initial expense ?

   For this question I am wondering if some maintenance effort could be reduced and maintenance safety increased by using a higher ceiling in the Barron Creek underground channel. For example, a higher ceiling would
   a) allow a small tractor (e.g. "Bobcat" or front-loader) to be run through the inside of the channel to make quick work of removing debris; (assuming the channel would support the weight of such a tractor), and
   b) allow workers to walk comfortably upright inside the channel rather than stooping (less back strain/injury).

Thank you for your consideration of this letter. If you wish to reply to my questions by telephone, I can be reached at (415) 857-5214 or (415) 857-5025 (paging) during 9AM-6PM most week days, or at (415) 856-2190 at home other times. However, a written reply would be preferred.

Sincerely,

K. Knute Kresie
844 Ilima Court
Palo Alto, Ca. 94306

cc: Mr. Bob Moss, Chairman of the Creeks Committee of the Barron Park Association, 4010 Orme, Palo Alto, Ca., 94306.

[illegible]
cc: KRS "
" BRT "
KWW
EHG
SNW

January 25, 1988

Susan A. Pino
Clerk of the Board of Directors
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: Flood control project on Matadero and Barron Creeks

Dear Ms. Pino:

Enclosed you will find 12 photographs and a small map I wish to enter these with my comments on the subject topic. These photographs were taken of the bike path route from Matadero to the Varian fence. By placing #1 in the middle at the bottom, L2 on the left, R2 on the right and ending with number #5 at the top in the middle, I believe you will have the sequence of the whole location from Matadero to the Varian fence. The photos A, B, C, and D (starting with A on the bottom and D at the top) should be placed to the right of the numbered R pictures to give you the same location as seen from the backyards of the residents on Chimalus.

In these photos it shows that the majority of the largest and oldest trees are on the right side of the existing bicycle path. To the left, there are mainly shrubs that have come up on a volunteer basis or small shrubs that could be easily replaced. Some of the trees on the right are as old as 20 to 40 years. I spoke to Mr. John Fisk at the ~~U~~.S. Department of Forestry, Timber Management Division for the information that I have gathered for this comment. Where as Pines and Redwoods may grow as much as 2 to 3 feet a year when they are young (they slow down after about 5 years), the Firs and Cedars may only grow a foot a year, and Live Oaks (which are shown on the right side of the path) may only grow 6 to 12 inches in a year.

To take down these trees for such a short term need of a temporary bike path seems to be a sacrilege. This will also infringe on some of the trees that are within the fences of some of the residents on Chimalus Drive. I for one will have two 40 foot Pine trees damaged if there is much digging away for the temporary bike path. The root system of Pines is relatively shallow and digging down as far as just a few feet could kill or damage trees that I have spent over 20 years trying to feed, water and prune, to have them grow into a very effective privacy and sun screen. The root system of Pines, and almost all of the other trees on that side of the existing bike path. is equal to, or larger than the crown of the tree.

Santa Clara Valley Water District
page two
January 25, 1988

Here are my questions and comments:

1. Why is it so necessary for there to be a bike path during the short duration that there will be work in progress in this area?

2. Why does the culvert have to follow the exact route of the existing bike path. Couldn't it go to the left of the existing path and then allow the existing path to remain open during the work in this area?

3. Why does the temporary bike path have to be put in on right hand side of the existing path and cause the removal of the green belt trees that will take 20 to 40 years to replace? To say nothing of the damage of the trees in the Chimalus yards that are adjacent to the proposed temporary bike path. How do we save our trees? How can we replace something that we have spent years cultivating to achieve the privacy and shade we now have?

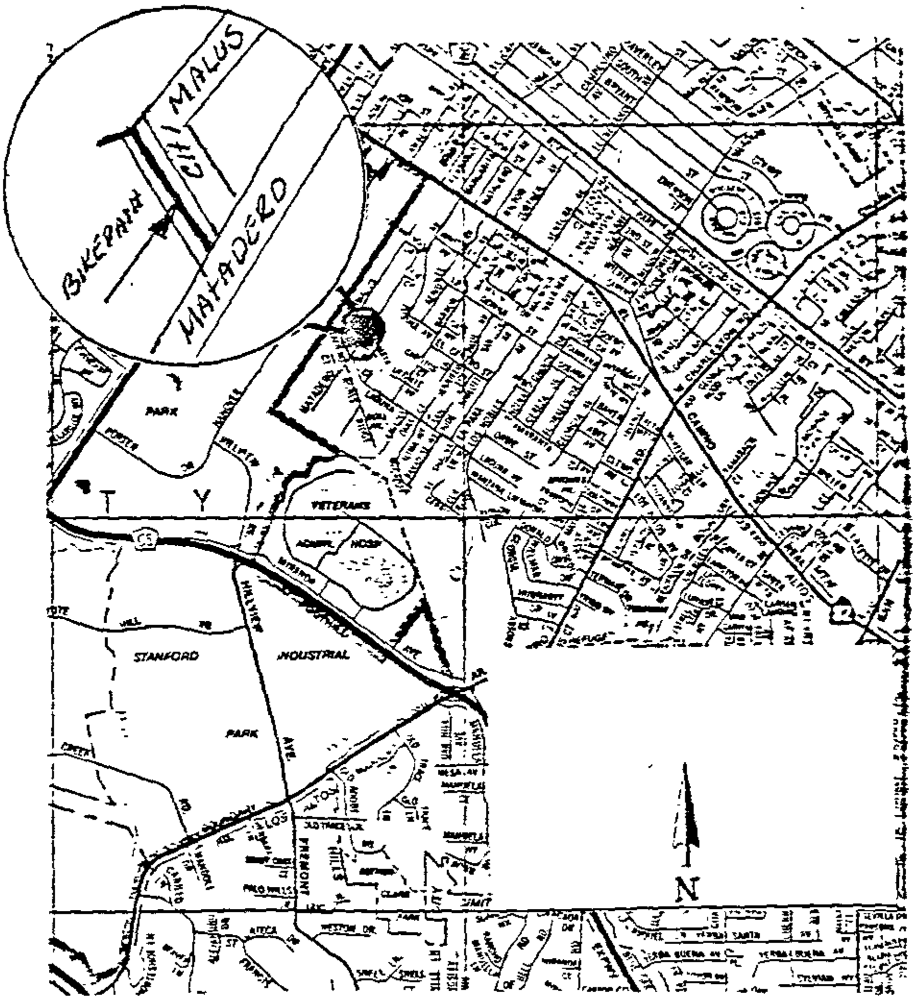
I would appreciate hearing from you regarding these questions and comments. I can be reached during the day at W.A. Krueger San Francisco 861-610 3or after 7 P.M. at my residence 493-1266

Thank you,

Merry Free Osborn

Merry Free Osborn
878 Chimalus Drive
Palo Alto, CA 94306

cc: Mr. Robert Smith
Mr. Randy Talley

BIKEPATH
CIT MALUS
MATADERO
PARK
VETERANS
ADMIN. HOSP.
STANFORD
INDUSTRIAL
PARK
EL CAMINO
N

January 12, 1988

Santa Clara Valley Water District

1/13-RRS
SNW
RRT
KWW
BHG

Robert R. Smith
Flood Control Manager

Dear Sir:

My husband and I - recived the mail of Dec. 21, 1987: With the information concerning the proposed flood control project on Matadero & Barron Creeks

We appreciate receiving all of the information, and we are very happy and pleased that something will be done to prevent further flooding.

We have lived in our home for 41 years in June. We have experienced four floods during these years.

The 1st - took place in the Winter of 1953 or 1954.

The 2nd - took place several years later and we can't seem to remember which year?. but I do remember that Mr. William Carlsen was: Associate Civil Engineer of The Flood Control Dept. (Meetings were held at that time in our area.)

The 3rd & 4th - took place within one week, during the Winter of 1983.

So, I'm sure that you can understand our concern over the flooding conditions of Barron Creek.

We are for the Proposed Project

Ansgar P. Movik
Jane S. Movik // 663 Los Robles Ave.
Palo Alto, Ca. 94306

112-EHG
SNW
RRS
KKT
KWW

VANCE M.
BROWN & SONS, INC.
GENERAL CONTRACTORS
License No. 122847
2747 PARK BOULEVARD • PALO ALTO, CALIFORNIA 94306 • (415) 321-8432

January 8, 1988

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, Ca. 95118

Attn: Dr. Bernie Goldner

RE: 3197 PARK BOULEVARD, PALO ALTO, CA.

Gentlemen:

We have reviewed the copy of the Santa Clara Valley Water District's Engineer's Report and Draft Negative Declaration for a proposed flood control project on Matadero and Barron Creek's dated December, 1987. We have serious concerns regarding the impact of your design intentions on our property. We have listed below the items which we request be incorporated into your plan in order for the plan to meet with our approval.

1. The property where the existing channel is to be removed and backfilled is to be deeded to Park City Leasing.
2. The property where the existing channel is to be removed and backfilled is to be backfilled to a relative compaction of 95%. The method of backfill is to be approved by Park City Leasing prior to commencement.
3. Total bridging of the channel through our property will need to be constructed across the channel in order to allow us to provide adequate off-street parking for our building.
4. An asphalt parking surface on the far side of the channel will need to be provided to compensate for the loss of parking on the building side of the creek. This parking surface must meet all construction requirements of the City of Palo Alto.
5. The sidewalks in front of our building extending 150'-0" on each side of the Park Boulevard Bridge must be revised to take into account the proposed 1% approach grades on Park Boulevard at the bridge.
6. The elevation of the existing surfaces on both sides of the proposed channel must be revised where impacted by the proposed 1% approach grades to the Park Boulevard Bridge.

Santa Clara Valley Water District
Re: 3197 Park Boulevard, Palo Alto, Ca.
continued - page 2
1/8/88

7. The Santa Clara Valley Water District must hold harmless Park City Leasing for any damages sought for any actions which take place during construction of the section of channel passing through the lands of Park City Leasing.
8. Construction of improvements is not be prevent normal business operations of the building occupants.

Please let us know how you intend to satisfy our concerns.

Sincerely,

PARK CITY LEASING

Allan F. Brown,
General Partner

AFB/rsb
ref:3197 Park Blvd.

129-SAF(Bd.)
RRS
SNW
RRT
KWW
BHG

Mrs PAF3 - Foothill planning study

26 January, 1988

Jennifer Raymond
284 Margarita Avenue
Palo Alto, CA 94306

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

To: Members of the Board of Directors

I am writing to express my thoughts and concerns relating to the proposed Matadero and Barron Creek Project. I am a resident of the neighborhood adjacent to Reach 6, and after attending the hearing of January 20, 1988, feel it would be useful to summarize my comments in writing.

1. First, I am concerned about the trees which border the SCVWD easment in Boulware Park. These include several large eucalyptus and pines located right next to the fence on the southeast side of the creek. I was assured by you, during our discussion at the meeting, that these trees will not be damaged or removed. If, for any reason, this is not the case, I would request that they be replaced by trees of like kind and size.

2. My second concern has to do with any re-routing of traffic that may be necessary during construction of the Lambert Avenue bridge. Lambert Avenue is fairly heavily travelled, especially by large industrial vehicles. In the event that a detour is necessary, I would ask that this traffic not be detoured through the adjacent residential area, i.e. down Fernando and Margarita Avenues.

3. I am concerned about the long-term building plans for Stanford Research Park and the ability of the Stanford Channel to handle the increased run-off. Has this been considered in your calculations?

4. A number of individuals in the neighborhood are concerned that, if easily accessible, the Matadero bypass could become a "hangout" during times of low flow. We would like to see the confluence designed in such a way that access to the bypass will be minimized.

Thank you for your time and consideration of these issues. I will look forward to working with you in the future as this project progresses.

Sincerely,

Jennifer Raymond

Jennifer Raymond

Mat. Cr Fk
Foothill Expwy
Planning Study

El Camino Center

755 PAGE MILL ROAD, SUITE A200 • PALO ALTO, CALIFORNIA 94304 • (415) 493-5411

January 29, 1988

2/1 RRT
KWW
SNW
RRS
GHG

Mr. Randall R. Talley, P.E.
Sr. Civil Engineer
Predesign Division
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Re: SCVWD Project #1021
Improvements for Matadero Creek

Dear Randy:

I appreciated meeting with you and Keith Whitman yesterday in your offices. The purpose of this letter is to list for you the concerns that the owners of the El Camino Center have with respect to the proposed improvements to the Matadero Creek.

The El Camino Center is a partnership which owns the warehousing complex between Ash Street and Park Boulevard and adjacent to Portage Avenue in Palo Alto. The El Camino Center owns the warehousing complex to the north of the Matadero Creek and also a triangular piece of property to the south of the Matadero Creek adjacent to and west of Park Boulevard. Because the Matadero Creek roughly bisects the property, we have some concerns and wish to express them herein.

The portion of the Matadero Creek affecting our property is most generally found on sheets number 10 and 11 of the Matadero Creek General Plan Flood Basin to Foothill Expressway drawings.

1. As I mentioned to you, the City of Palo Alto has rezoned the entire piece of property effected to a residential designation. At some point in time, the property may be completely redeveloped and it may be prudent at that time to bridge over the Creek to connect the two pieces of properties. If the Creek adjacent to our property were totally covered it would be capped from the intersection of the Creek and Lambert Street to the intersection of the Creek and Park Boulevard. You have expressed concerns about the ability to maintain the Creek should it be completely capped, but we would like to raise the possibility of capping it intermitently throughout that distance.

2. We are very concerned about the esthetic appearance of the sidewalls to the proposed U-frame channel. It is our understanding that the SCVWD is willing to grade to the top of the wall so that none of the sections of the wall would be visible. Additional landscaping and planting could, therefore, be placed adjacent to the walls of the proposed U-frame channel.

3. It is our understanding that the bridge on Park Boulevard over the Creek will be raised and we are very concerned how this will affect the Park Boulevard entry to our warehousing complex. We are concerned not only about two way ingress and egress to our property, but we are also concerned about drainage to that area.

4. Our property has two large storm drains that dump through the sidewalls of the Matadero Creek. We have a fifteen inch steel pipe that runs from the warehousing complex through the sidewall of the Creek, about 60 feet west of Park Boulevard. We also have a drop inlet that opens into the Creek about 30 feet east of Park Boulevard. We are concerned that should the water level within the channel rise above the grade of our property that water from the channel could back up through the discharge pipes and flood the El Camino Center. We, therfore, would request that a backflow device be installed where the pipes enter into the Creek so that this can be avoided.

5. You have also indicated that on the south side of the Matadero Creek the access road does not necessarily have to be within the chain link fence bordering on the edge of your easement and that if we redevelop the property in such a manner that parking was provided and that your vehicles could have easy access to the Creek that the fence may be able to be moved back to the top of the wall. We would be interested in pursuing such an arrangement at such time as we redevelop the property.

We are keenly interested in the execution of these improvements in the area which affects our property. We would appreciate during the planning and specification phase if you would submit to us drawings which detail the work to be accomplished in our area. We would also like to be informed of the schedule for all meetings and other opportunities for exchange of information that may be occurring over the next several years. We wish to cooperate with the SCVWD in any way that we can and hope to be helpful to you in your process. If you should have any questions, give either me or Joe Gorman, Vice President of Opertions for WSJ Properties a call at (415) 493-5411.

Sinerely,

Greg Osborn

W. Greg Osborn

WGO:ak

1/25 [illegible] RR [illegible]

Dr. Bernie Goldner
Santa Clara Valley Water District
San Jose

Re: proposed flood control project for Matadero & Barron Creeks

Dear Dr. Goldner,

In general we support the Water Districts plan to build a _bypass_ channel north of Chimalus Drive. The natural character of Matadero Creek as it is now is a community asset, both for esthetic & recreational reasons. It is also a riparian habitat frequented by increasingly large flocks of ducks and, of late, by snowy egrets! The creek is also home to many skunks, opossums & raccoons. The alternative options for the creeks are unacceptable to us, involving as they do, condemnation of homes & environmental _degradation_.

We have one further comment. _Matadero_ creek has _not_ had a flooding problem even during the winter of very heavy rains ('82? '83?)

except near El Camino Real where the culvert under the highway was not adequate to carry off the water. There was therefore some overflow at the Creekside Inn ("Flamingo Lodge") area. By far the largest volume of flooding in Barron Park was caused by *Barron* Creek. The water from that creek overflowed into several blocks of homes *because* the culvert under Los Robles Avenue is *totally inadequate*. *There*fore the only acceptable alternative (in our opinion) to the by-pass solution would be to tear up the Los Robles culvert & enlarge *that*.

Sincerely,
Helen J. England
Robert L. England

3658 La Calle Court
Palo Alto 94306

1001
mtg 11-5 [illegible]
planning [illegible]

Donald H. Freiberg
842 Clara Drive
Palo Alto, CA 94303

January 25, 1988

Mr. Joe Pandit
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear Mr. Pandit:

The purpose of this letter is to ask that you consider a simple and inexpensive addition to the proposed Matadero and Barron Creek modifications.

As you are aware, the Western Toad inhabits our creek areas. They live in the creeks as tadpoles and during their breeding period. Once they mature into toads, however, they climb up the sloped concrete walls along the creeks, then pass through gaps in wooden fences to spend their adult lives in neighboring yards. They help greatly to reduce the insect problem, particularly the mosquitoes.

The proposed addition of the vertical concrete walls onto existing sloped walls would prevent these toads from completing their life cycle, as they could not climb the vertical walls. Therefore, their habitat would be greatly reduced everywhere the vertical walls are present. The few existing truck access ramps lead directly onto the street, and therefore those toads that make it up the ramps would likely be crushed by cars.

A few small holes in the concrete wall would allow the toads to pass freely while letting so little water through that there would be virtually no increased flood risk. These holes could be rectangular in shape, approximately two inches high, and parallel to the ground. The cost of such additions would be almost nothing, accomplished by merely placing a small rectangular metal tube, the width of the new wall, on the ground as the concrete is poured.

Such additions would save the Western Toad in our area.

Thank you for your concern.

Very truly yours,

[illegible]
SJW
KVK
LKT
CKS

[illegible]

Sheila Dunec
748 Chimalus Drive
Palo Alto, CA 94306

January 28, 1988

Bernie Goldner
Environmental Specialist
Snata Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Dear Bernie,

I am writing to make two recommendations to improve the Flood Control Project proposed for Matadero and Barron Creeks. The first involves additional landscaping along the Matadero Bypass Channel where it borders the Varian parking lot, while the second suggests making minor modifications to the concrete lining Matadero Creek to aid the restoration of steelhead trout habitat.

My first recommendation is to provide additional full scale trees along the Varian parking lot as mitigation for the inconvenience, in terms of dirt and noise, caused by the Project to Chimalus Drive residents. The niches in the existing sound wall provide excellent planting sites for full scale trees which would eventually add much-needed screening of the industrial site for residents. I've discussed this proposal with Carl Clemm, Director of Facilities at Varian, and he is not opposed to the idea as long as it is incorporated into the overall landscape plan.

My second recommendation, to make minor modifications to the concrete lining Matadero Creek between El Camino Real and Greer Road, is prompted by evidence that steelhead trout are attempting to return to this Creek. Matadero was originally a natural trout stream and according to Fish and Game Wildlife Biologist, Linda Ulmer, there is evidence that these native fish are attempting to return. Last winter, a mature adult succeeded in swimming all the way to the natural creekbed above El Camino; another died from exhaustion in the concrete portion of the channel near Greer Road.

The Department of Fish and Game suggests that low-cost modifications can be made to the concrete lining of the Creek which will provide resting places for these fish, thus enabling them to reach the natural portion of the creekbed to spawn. I urge the District to work in close cooperation with the Department of Fish and Game to explore the feasibility of whatever modifications are necessary to restore this native steelhead trout habitat.

.../2.

These two recommendations have met with a very favorable response from the Chimalus Drive residents with whom I've spoken, as well as from John Joynt, President of the Barron Park Association. John will discuss these ideas in full at the next BPA Board meeting. We hope to have Linda Ulmer from the Department of Fish and Game out to walk the natural portion of Matadero Creek in the very near future.

I feel these two recommendations represent an opportunity for the Santa Clara Valley Water District to demonstrate its interest in developing a more environmentally-sensitive project, as well as an opportunity to generate considerable public goodwill toward your agency. Please keep me informed.

Sincerely,

Sheila Dunec

Sheila Dunec
748 Chimalus Drive
Palo Alto, CA

cc: Carl Clemm
Linda Ulmer
John Joynt

1/c.

SAP
RRS
JHW
EKT
KWW
BMG

January 26, 1988

I am opposed to the Matadero and Barron Creeks proposed project.

I belive the flooding problems are due to two causes. The creeks flows are impeded by debris and poor maintenance. Stanford is covering the ground surfaces.

If the creeks were optimally maintained and Stanford was required to provide alternate means of water run off surpluses, Barron Park would not have a flood problem.

Sincerely,

Patricia A. Steck
860 Chimalus Dr.
Palo Alto
Ca. 94306

KKD
SNW
RRT
KWW ①
BFG

1-23-88

SANTA CLARA COUNTY WATER DISTRICT:

RE MATADERO CREEK - PALO ALTO.

GENTLEMEN:

I LIVE AT THE CORNER OF MATADERO AND JOSINA (655) IN BARRON PARK AND HAVE BEEN HERE OVER 35 YEARS.

I BELIEVE THE ONLY PERSON IN BARRON PARK WHOSE HOUSE AND LIVING QUARTERS HAVE BEEN FLOODED BY MATADERO CREEK IN THAT TIME IS ME, ONCE IN 1955 AND ONCE IN 1983. YOU'VE APPARENTLY DONE AN EXCELLENT JOB IN PREVENTING FLOODS FOR THIS CREEK IN OUR AREA.

THE TWO OCCASIONS ABOVE DID FLOW INTO OTHERS PEOPLES' GARAGE AS THERE WAS SOME WATER IN THE STREET WHICH WOULD ENTER STREET LEVEL GARAGES. THE DAMAGE WAS SMALL.

IN MY HOUSE NO DAMAGE WAS DONE. IT IS A SLAB. THE CERAMIC TILE FLOORS WERE NOT HURT. THE RUG WAS ROLLED AND PUT ON A COUCH. BOXES SUSCEPTIBLE TO WATER WERE PUT IN THE HOOD OF THE CAR - CONSEQUENTLY NO DAMAGE WHATSOEVER.

IN ANY EVENT I AM THE MOST LIABLE TO BE FLOODED AS THE WATER RICOCHETS OFF THE BRIDGE DIRECTLY TO MY HOUSE. BEING A REDWOOD HOME, WITH VERTICAL BOARDS, WATER SEEPS IN.

AS YOU KNOW IN '55 THE CREEK COULD NOT FLOW BECAUSE OF HIGH TIDE AND WATER COMING IN AT 90° AT EL CAMINO PLUS THE UGLY CEMENT LINED DITCH WITH THE CYCLONE FENCE IN PALO WOULDN'T TAKE THE WATER AND BACKED EVERYTHING UP.

YEARS LATER THE BRIDGE AT MATADERO WAS WIDENED ABOUT 60%. WHAT WAS LEFT AFTER YOUR WORK IS ONE OF THE UGLIEST INTERSECTION AND FENCING IN BARRON PARK. IF YOU LOOK AT THE UGLY JERRY-BUILT FENCING YOU'LL SEE WHY WE HAVE A FEAR OF WHAT YOU WILL PRODUCE WITH YOUR FLOOD CONTROL WORK.

WHEN I RAN THE LAS ENCINAS SANITARY DISTRICT WE HAD A MAN REMOVE SNAGS, DEBRIS, ETC DURING HEAVY STORMS.

I CAN'T SPEAK FOR BARRON CREEK - I BELIEVE YOU PEOPLE PUT IN PIPE AND COVERED THE CREEK WITH TOO SMALL A PIPE. NOW WE MUST EXPENSIVELY CORRECT THAT WORK.

THE MATADERO CREEK IN THE LAST STORM WAS NOT HALF FULL IN SPITE OF THE PALO ALTO TIMES RAVING ABOUT A NEAR FLOOD. IT'S BEEN MUCH HIGHER THAN THAT MANY TIMES AND NEVER HAD SUCH RAVE NOTICES - SOMEBODY MUST BE

S. C. COUNTY WATER DIST. (2) 1-23-88

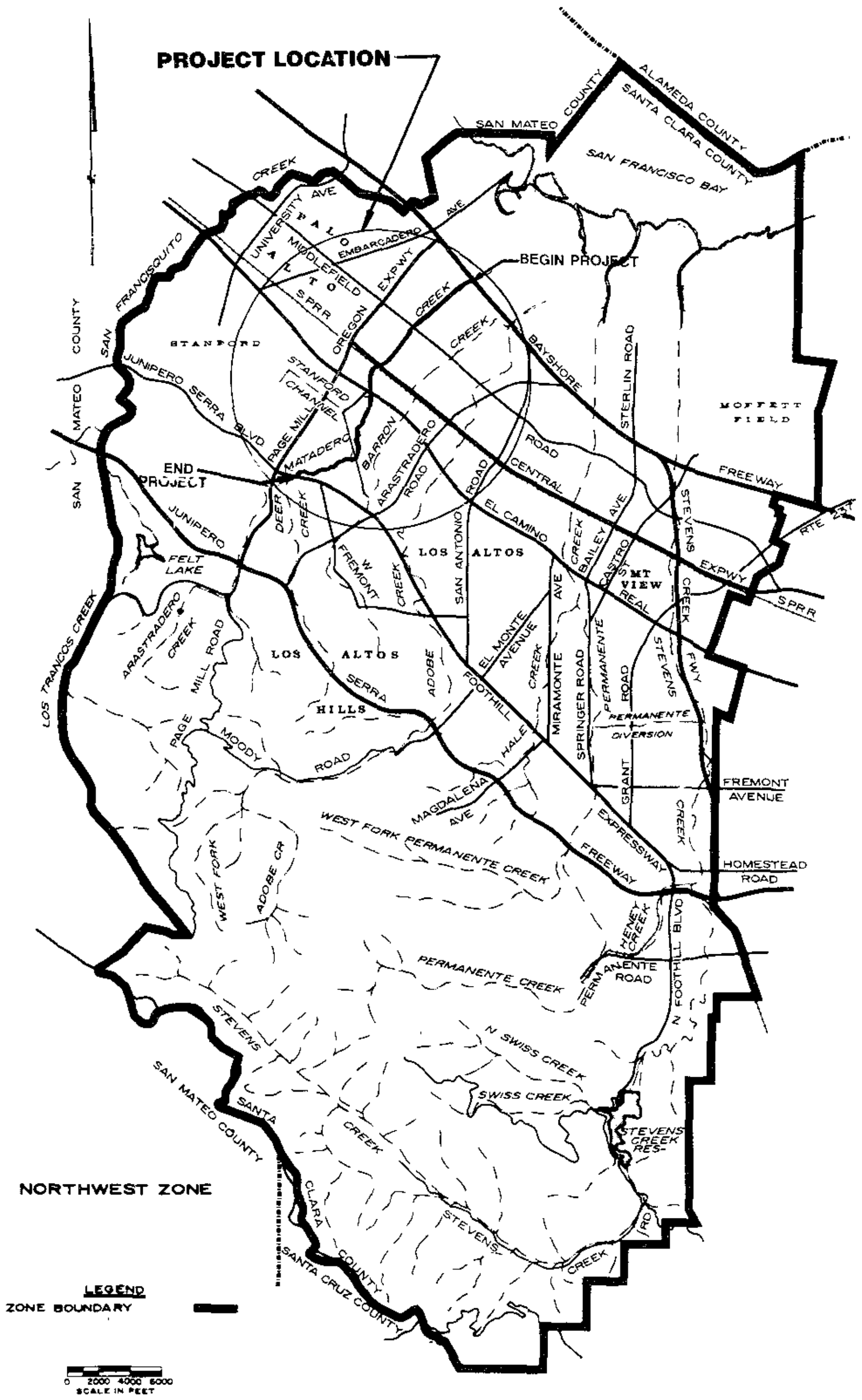
PADDING THINGS FOR THEIR VIEWPOINTS
IF YOU ARE GOING TO WIDEN MATADERO CREEK IN BARRON PARK FOR A LOT OF MONEY (WHICH I THINK WE NEED LIKE THE PROVERBIAL HOLE IN THE HEAD) AT THE SACRIFICE OF LOOKS AND AESTHETICS, I'M AGIN' IT. MATADERO JUST NEEDS NORMAL MAINTENANCE AND CLEANING.

NO BODY'S HOUSE AROUND HERE IS LOW ENOUGH TO FLOOD. SOME GARAGES YES.

HOPE YOU GET THIS BEFORE THE 28th OF JAN. DEADLINE.

Robert J. O'Connor

ROBERT J. O'CONNOR
655 JOSINA AVENUE
PALO ALTO - CA. 94306
415 493 9124



MAP AND GENERAL PLAN

FOR

MATADERO CREEK

FROM PALO ALTO FLOOD BASIN TO FOOTHILL EXPRESSWAY (INCLUDES BARRON DIVERSION CHANNEL AND MATADERO BYPASS CHANNEL)

Santa Clara Valley Water District

NORTHWEST FLOOD CONTROL ZONE

PROJECT NO. 1021

INDEX

SHEET NO.	DESCRIPTION
1	MAP & TITLE PAGE
2	INDEX MAP
3-20	PLAN & PROFILE
21-23	DETAILS

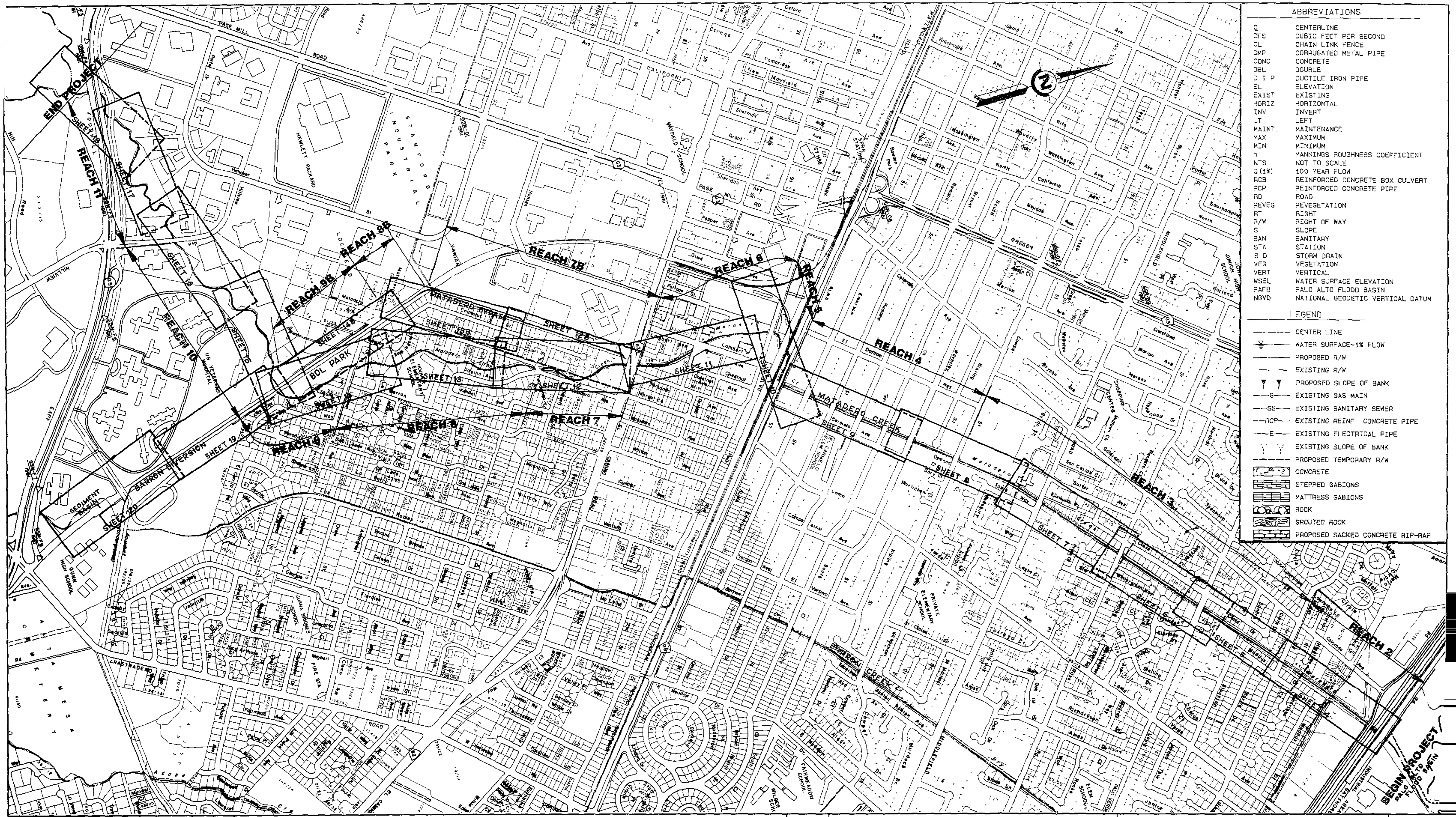
1/10
1 INDICATES DETAIL NUMBER
10 INDICATES NUMBER OF SHEET ON WHICH DETAIL APPEARS

A/10
A INDICATES SECTION
10 INDICATES NUMBER OF SHEET ON WHICH SECTION APPEARS

PROJECT APPROVAL:

R.R. Smith
FLOOD CONTROL MANAGER

DATE: 3-17-88



ABBREVIATIONS

℄	CENTERLINE
CFS	CUBIC FEET PER SECOND
CL	CHAIN LINK FENCE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DBL	DOUBLE
D I P	DUCTILE IRON PIPE
EL	ELEVATION
EXIST	EXISTING
HORIZ	HORIZONTAL
INV	INVERT
LT	LEFT
MAINT.	MAINTENANCE
MAX	MAXIMUM
MIN	MINIMUM
n	MANNINGS ROUGHNESS COEFFICIENT
NTS	NOT TO SCALE
Q (1%)	100 YEAR FLOW
RCB	REINFORCED CONCRETE BOX CULVERT
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REVEG	REVEGETATION
RT	RIGHT
R/W	RIGHT OF WAY
S	SLOPE
SAN	SANITARY
STA	STATION
S D	STORM DRAIN
VEG	VEGETATION
VERT	VERTICAL
WSEL	WATER SURFACE ELEVATION
PAFB	PALO ALTO FLOOD BASIN
NGVD	NATIONAL GEODETIC VERTICAL DATUM

LEGEND

——-———	CENTER LINE
▽———	WATER SURFACE–1% FLOW
———	PROPOSED R/W
———	EXISTING R/W
▼ ▼	PROPOSED SLOPE OF BANK
——G——	EXISTING GAS MAIN
——SS——	EXISTING SANITARY SEWER
——RCP——	EXISTING REINF CONCRETE PIPE
——E——	EXISTING ELECTRICAL PIPE
Y Y	EXISTING SLOPE OF BANK
—-—-—	PROPOSED TEMPORARY R/W
▨	CONCRETE
▤	STEPPED GABIONS
▦	MATTRESS GABIONS
▩	ROCK
▧	GROUTED ROCK
▥	PROPOSED SACKED CONCRETE RIP-RAP

REV	DESCRIPTION	DATE	APPR	REFERENCE INFORMATION AND NOTES

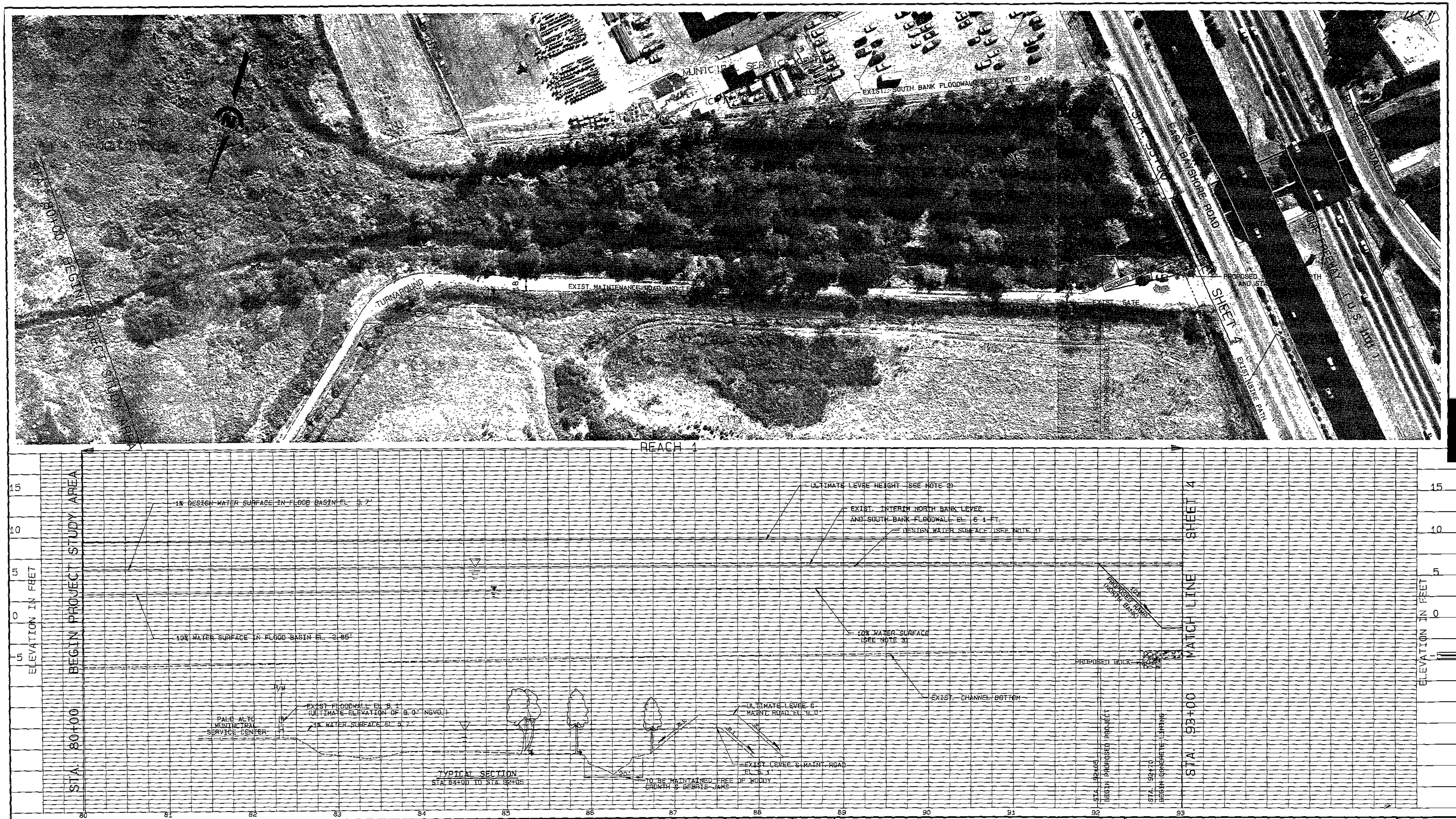
DATE 2-1-88
DESIGN ML
DRAWN E S W
CHECKED KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION Randy Talley
ENGINEERING APPROVAL

INDEX MAP
MATADERO CREEK

SCALE 1" = 500'
SHEET 2



REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES:

1. DESIGN WATER SURFACE ELEVATION BETWEEN PAFB AND STA. 105+00 COMPUTED BASED UPON STARTING WSEL IN PAFB OF 5.7', Q=1,500 CFS; N= 065 DOWNSTREAM BAYSHORE FWY.
2. LEVEE CONSTRUCTED IN 1986 TO ELEVATION 6.1' NGVD, ULTIMATE LEVEE AND FLOODWALL ELEVATION 9.0' MUST PROVIDE A MINIMUM OF 3 FEET FREEBOARD ABOVE THE DESIGN WSEL (NOT PART OF THIS PROJECT).
3. 10% WATER SURFACE BETWEEN PAFB AND STA. 102+00, COMPUTED BASED UPON STARTING WSEL IN PAFB OF 2.85', Q=1,230 cfs

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 10-28-85 RECTIFICATION BY:

DATE
2-1-88

DESIGN
KWW

DRAWN
TUCKER

CHECKED
KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION

Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35883

Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL

Stan Wolf
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

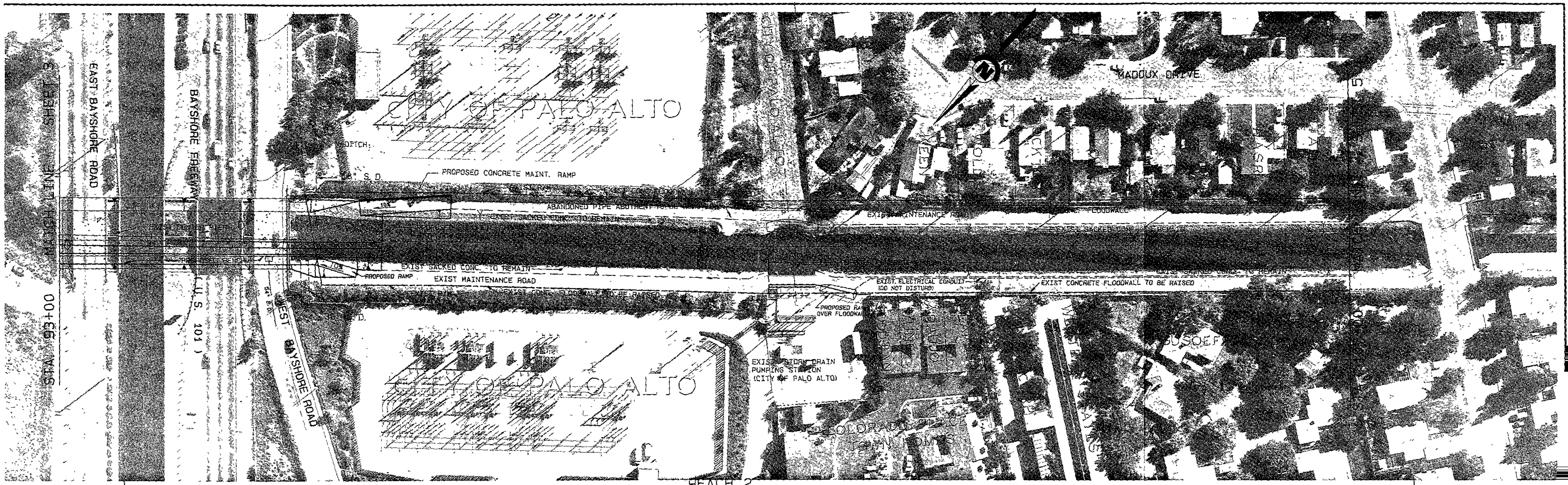
MATADERO CREEK

GENERAL PLAN

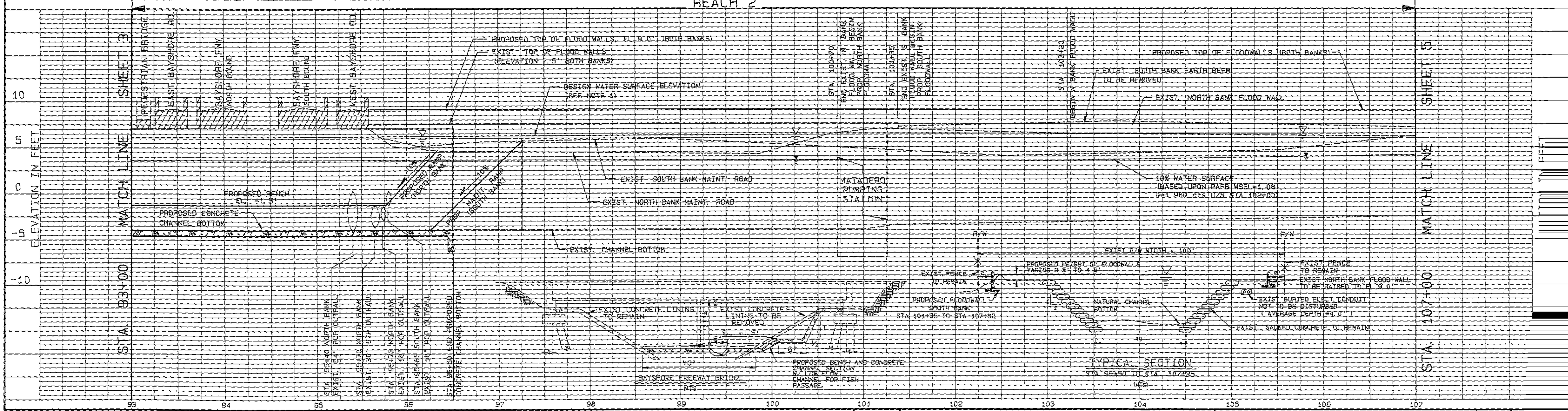
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50
V: 1"=5

SHEET
3



MATCH LINE SHEET 3
STA. 93+00
EAST BAYSHORE ROAD
BAYSHORE FREEWAY
(U.S. 101)
WEST BAYSHORE ROAD
CITY OF PALO ALTO
CITY OF PALO ALTO
DITCH
S.D.
PROPOSED CONCRETE MAINT. RAMP
ABANDONED PIPE ABUTMENT
EXIST. SACKED CONC. TO REMAIN
EXIST. SACKED CONC. TO REMAIN
PROPOSED RAMP
EXIST MAINTENANCE ROAD
EXIST. CONC. FLOODWALL TO BE RAISED
EXIST. MAINTENANCE ROAD
FLOODWALL
EXIST. SACKED CONC. BERM
EXIST. ELECTRICAL CONDUIT (DO NOT DISTURB)
EXIST CONCRETE FLOODWALL TO BE RAISED
PROPOSED RAMP OVER FLOODWALL
EXIST. STORM DRAIN PUMPING STATION (CITY OF PALO ALTO)
COLORADO
MADDOUX DRIVE



REACH 2
MATCH LINE SHEET 3
STA. 93+00
MATCH LINE SHEET 5
STA. 107+00
ELEVATION IN FEET
10
5
0
-5
-10
PEDESTRIAN BRIDGE
EAST BAYSHORE RD.
BAYSHORE FWY. NORTH BOUND
BAYSHORE FWY. SOUTH BOUND
WEST BAYSHORE RD.
PROPOSED TOP OF FLOOD WALLS, EL. 9.0' (BOTH BANKS)
EXIST. TOP OF FLOOD WALLS (ELEVATION 7.5' BOTH BANKS)
DESIGN WATER SURFACE ELEVATION (SEE NOTE 1)
STA. 100+70 END EXIST. N. BANK FLOOD WALL BEGIN PROP. NORTH BANK FLOODWALL
STA. 101+35 END EXIST. S. BANK BEGIN PROP. SOUTH BANK FLOODWALL
STA. 103+ BEGIN N. BANK FLOOD WALL
PROPOSED TOP OF FLOODWALLS (BOTH BANKS)
EXIST. SOUTH BANK EARTH BERM TO BE REMOVED
EXIST. NORTH BANK FLOOD WALL
10% PROPOSED RAMP (NORTH BANK)
10% PROP. MAINT. RAMP (SOUTH BANK)
EXIST. SOUTH BANK MAINT. ROAD
EXIST. NORTH BANK MAINT. ROAD
MATADERO PUMPING STATION
10% WATER SURFACE (BASED UPON PAFB WSEL=1.08, Q=1,960 CFS U/S STA 102+00)
PROPOSED BENCH EL. -1.5'
PROPOSED CONCRETE CHANNEL BOTTOM
EXIST. CHANNEL BOTTOM
STA. 95+40 NORTH BANK EXIST. 54" RCP OUTFALL
STA. 95+70 NORTH BANK EXIST. 30" CIP OUTFALL
STA. 95+73 NORTH BANK EXIST. 18" RCP OUTFALL
STA. 95+85 SOUTH BANK EXIST. 18" RCP OUTFALL
STA. 96+50 END PROPOSED CONCRETE CHANNEL BOTTOM
EXIST. CONCRETE LINING TO REMAIN
EXIST. CONCRETE LINING TO BE REMOVED
BAYSHORE FREEWAY BRIDGE
NTS
PROPOSED BENCH AND CONCRETE CHANNEL SECTION W/ LOW FLOW CHANNEL FOR FISH PASSAGE
EXIST. FENCE TO REMAIN
PROPOSED FLOODWALL SOUTH BANK STA 101+35 TO STA 107+82
PROPOSED HEIGHT OF FLOODWALLS VARIES 2.5' TO 4.5'
EXIST. R/W WIDTH = 100'
R/W
R/W
NATURAL CHANNEL BOTTOM
EXIST. FENCE TO REMAIN
EXIST. NORTH BANK FLOOD WALL TO BE RAISED TO EL. 9.0'
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED (AVERAGE DEPTH = 4.0')
EXIST. SACKED CONCRETE TO REMAIN
TYPICAL SECTION
STA. 96+50 TO STA. 107+35
NTS
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN		

REFERENCE INFORMATION AND NOTES:

1 DESIGN WATER SURFACE ELEVATION BETWEEN PAFB AND STATION 105+00 COMPUTED BASED UPON STARTING WSEL IN PAFB OF 5.7', Q=1,500; n=.025 UPSTREAM OF BAYSHORE FWY.

ELEVATION UPSTREAM OF STA 105+00 COMPUTED BASED UPON Q1%=3,500 CFS. UPSTREAM OF BAYSHORE FWY

DATE	2-1-88
DESIGN	KWW
DRAWN	TUCKER
CHECKED	KWW

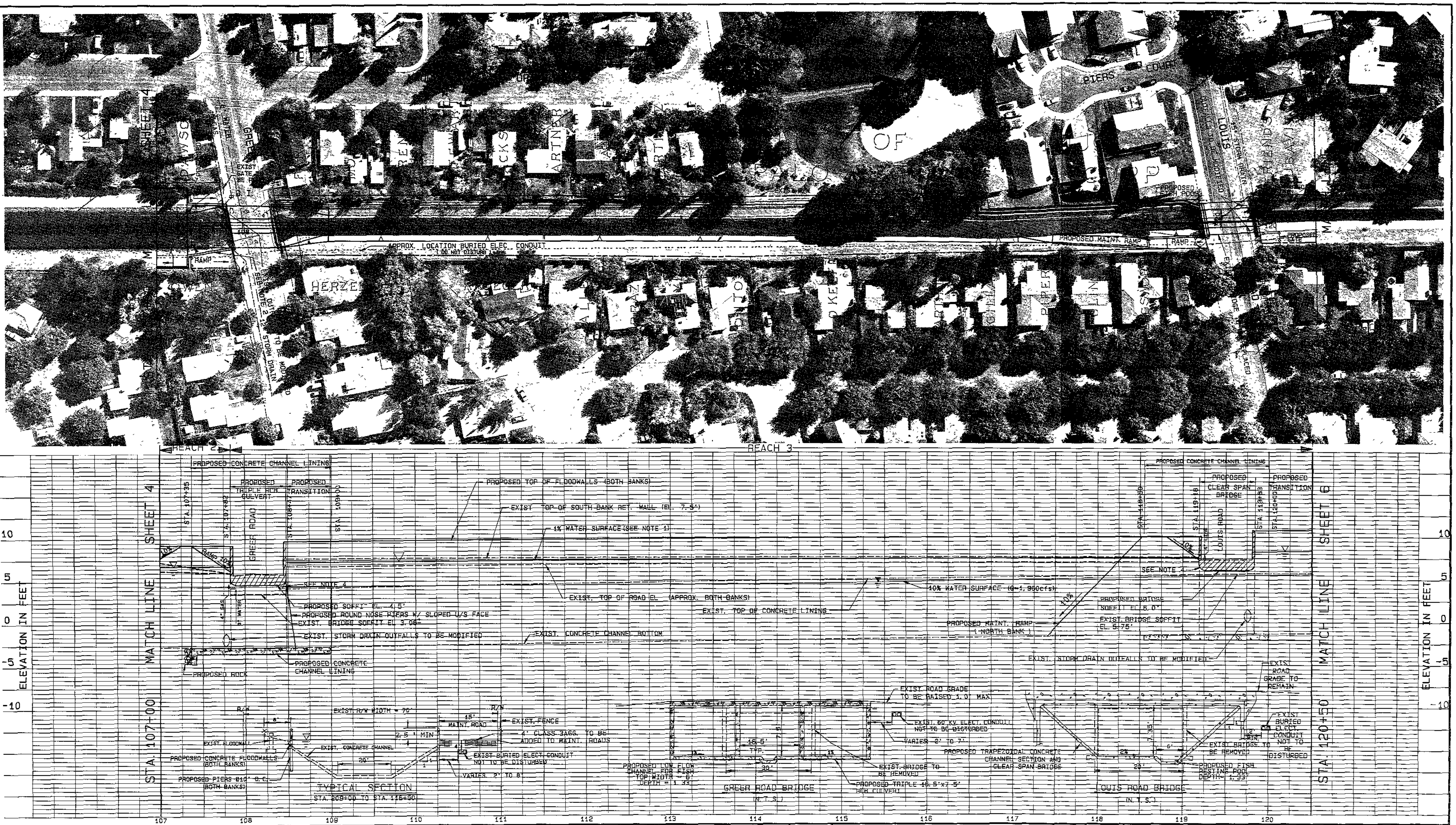
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

H
V


PIERS COURT
LOUIS
EXIST GATE
APPROX. LOCATION BURIED ELEC. CONDUIT (DO NOT DISTURB)
PROPOSED MAINT. RAMP
RAMP
PROPOSED FISH POOL
SEE NOTE 2 12" STORM DRAIN TO BE MODIFIED
REACH 2
REACH 3
PROPOSED CONCRETE CHANNEL LINING
PROPOSED TRIPLE RCB CULVERT
PROPOSED TRANSITION
STA. 107+35
STA. 107+82
GREER ROAD
STA. 108+47
STA. 109+00
PROPOSED TOP OF FLOODWALLS (BOTH BANKS)
EXIST. TOP OF SOUTH BANK RET. WALL (EL. 7.5')
1% WATER SURFACE (SEE NOTE 1)
RAMP 10%
10%
SEE NOTE 4
4" GAS
8" WATER
PROPOSED SOFFIT EL. 4.5'
PROPOSED ROUND NOSE PIERS W/ SLOPED U/S FACE
EXIST. BRIDGE SOFFIT EL 3.06±
EXIST. STORM DRAIN OUTFALLS TO BE MODIFIED
EXIST. CONCRETE CHANNEL BOTTOM
PROPOSED CONCRETE CHANNEL LINING
PROPOSED ROCK
EXIST. TOP OF ROAD EL (APPROX. BOTH BANKS)
EXIST. TOP OF CONCRETE LINING
10% WATER SURFACE (Q=1,960cfs)
PROPOSED MAINT. RAMP (NORTH BANK)
STA. 118+50
STA. 119+18
LOUIS ROAD
STA. 119+83
STA. 120+00
PROPOSED CLEAR SPAN BRIDGE
PROPOSED TRANSITION
PROPOSED BRIDGE SOFFIT EL 6.0'
EXIST. BRIDGE SOFFIT EL. 5.75'
EXIST. STORM DRAIN OUTFALLS TO BE MODIFIED
MATCH LINE SHEET 4
STA. 107+00
MATCH LINE SHEET 6
STA. 120+50
ELEVATION IN FEET
10
5
0
-5
-10
R/W
EXIST. R/W WIDTH = 70'
8'
15'
MAINT. ROAD
EXIST. FENCE
2.5' MIN
4" CLASS 3AGG. TO BE ADDED TO MAINT. ROADS
EXIST. FLOODWALL
EXIST. CONCRETE CHANNEL
20'
PROPOSED CONCRETE FLOODWALLS (BOTH BANKS)
PROPOSED PIERS @10' O.C. (BOTH BANKS)
EXIST BURIED ELECT CONDUIT NOT TO BE DISTURBED
VARIES 2' TO 8'
TYPICAL SECTION
STA. 109+00 TO STA. 116+50
PROPOSED LOW FLOW CHANNEL FOR FISH TOP WIDTH = 6' DEPTH = 1.33'
16.5' TYP.
30'
GREER ROAD BRIDGE
(N.T.S.)
EXIST ROAD GRADE TO BE RAISED 1.0' MAX
EXIST. 60 KV ELECT. CONDUIT NOT TO BE DISTURBED
VARIES 2' TO 7'
EXIST. BRIDGE TO BE REMOVED
PROPOSED TRIPLE 16.5'x7.5' RCB CULVERT
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
2%
7.35'
6'
EXIST ROAD GRADE TO REMAIN
EXIST BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST BRIDGE TO BE REMOVED
PROPOSED FISH RESTING POOL DEPTH= 1.33'
LOUIS ROAD BRIDGE
(N.T.S.)
107
108
109
110
111
112
113
114
115
116
117
118
119
120

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES:
1. WATER SURFACE BASED UPON Q1%=3500cfs. n=.015
2. SEDIMENT DEPTH AND STAGE MARKERS TO BE ADDED TO PROPOSED CHANNEL LINING DOWNSTREAM OF GREER ROAD.
3. SECTIONS VIEWED LOOKING UPSTREAM.
4. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVE AT UPSTREAM AND DOWNSTREAM FACES.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE
DATE: 10-28-85
RECTIFICATION BY:

DATE 2-1-88
DESIGN KWW
DRAWN CAM
CHECKED KWW

Santa Clara Valley Water District

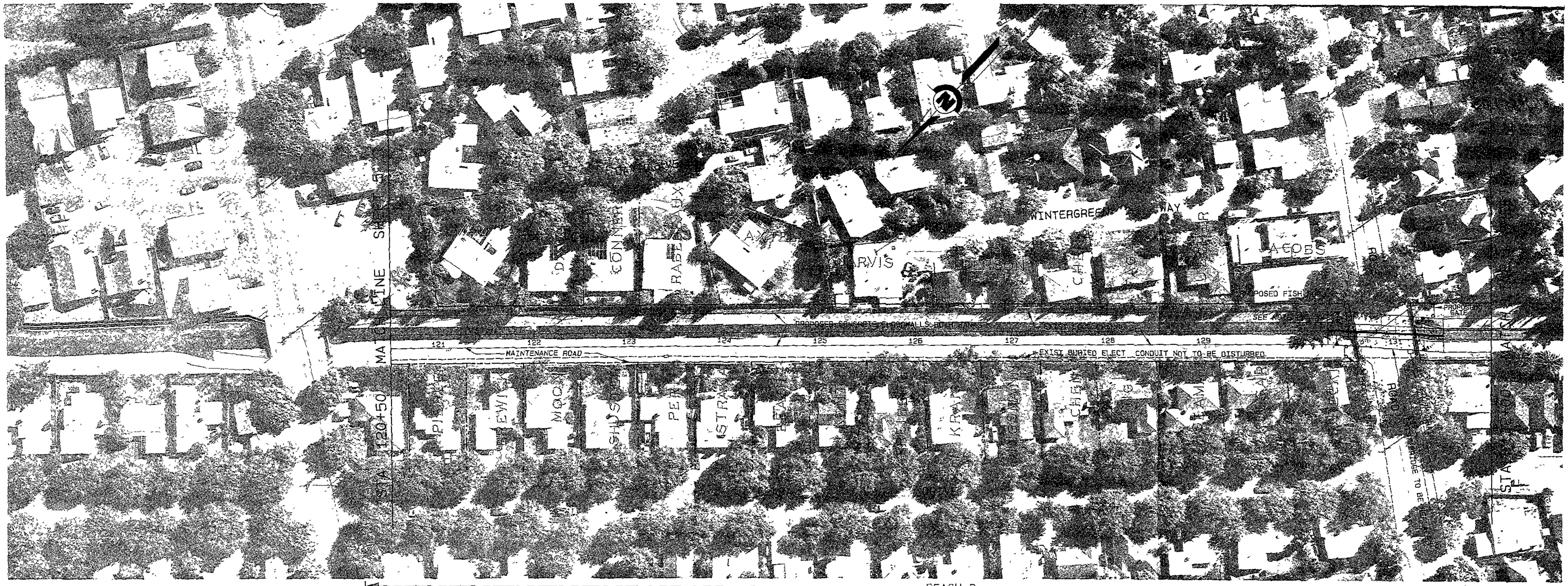
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25083

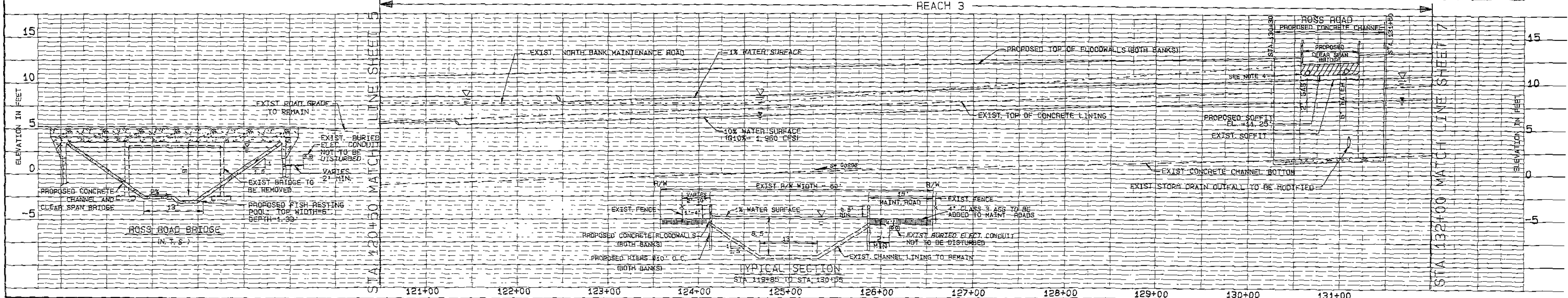
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
5





REACH 3
ELEVATION IN FEET
15
10
5
0
-5
EXIST ROAD GRADE TO REMAIN
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED
VARIES 21 MIN.
EXIST BRIDGE TO BE REMOVED
PROPOSED CONCRETE CHANNEL AND CLEAR SPAN BRIDGE
PROPOSED FISH RESTING POOL, TOP WIDTH=6', DEPTH=1.33'
ROSS ROAD BRIDGE
(N.T.S.)
STA 120+50 MATCH LINE SHEET 5
EXIST. NORTH BANK MAINTENANCE ROAD
1% WATER SURFACE
10% WATER SURFACE (Q10% = 1,980 CFS)
PROPOSED TOP OF FLOODWALLS (BOTH BANKS)
EXIST. TOP OF CONCRETE LINING
EXIST CONCRETE CHANNEL BOTTOM
EXIST STORM DRAIN OUTFALL TO BE MODIFIED
S= 00298
R/W
EXIST R/W WIDTH - 60'
EXIST. FENCE
1% WATER SURFACE
MAINT. ROAD
4" CLASS 3 AGG TO BE ADDED TO MAINT. ROADS
EXIST BURIED ELECT CONDUIT NOT TO BE DISTURBED
PROPOSED CONCRETE FLOODWALLS (BOTH BANKS)
PROPOSED PIERS @10' O.C. (BOTH BANKS)
EXIST. CHANNEL LINING TO REMAIN
MIN
13'
8.5'
1.5
TYPICAL SECTION
STA 119+85 TO STA 130+55
ROSS ROAD
PROPOSED CONCRETE CHANNEL
PROPOSED CLEAR SPAN BRIDGE
SEE NOTE 4
PROPOSED SOFFIT EL =11.25
EXIST. SOFFIT
STA 130+30
STA 131+80
STA 132+00 MATCH LINE SHEET 7
121+00
122+00
123+00
124+00
125+00
126+00
127+00
128+00
129+00
130+00
131+00

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3		

REFERENCE INFORMATION AND NOTES

1. WATER SURFACE BASED ON Q1% = 3500CFS, N= 015
2. SEDIMENT DEPTH AND STAGE MARKER TO BE ADDED TO PROPOSED CHANNEL LINING DOWNSTREAM OF ROSS ROAD
3. SECTIONS VIEWED LOOKING UPSTREAM
4. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVE AT UPSTEAM AND DOWNSTREAM FACES

RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN KWW
DRAWN CAM
CHECKED KWW

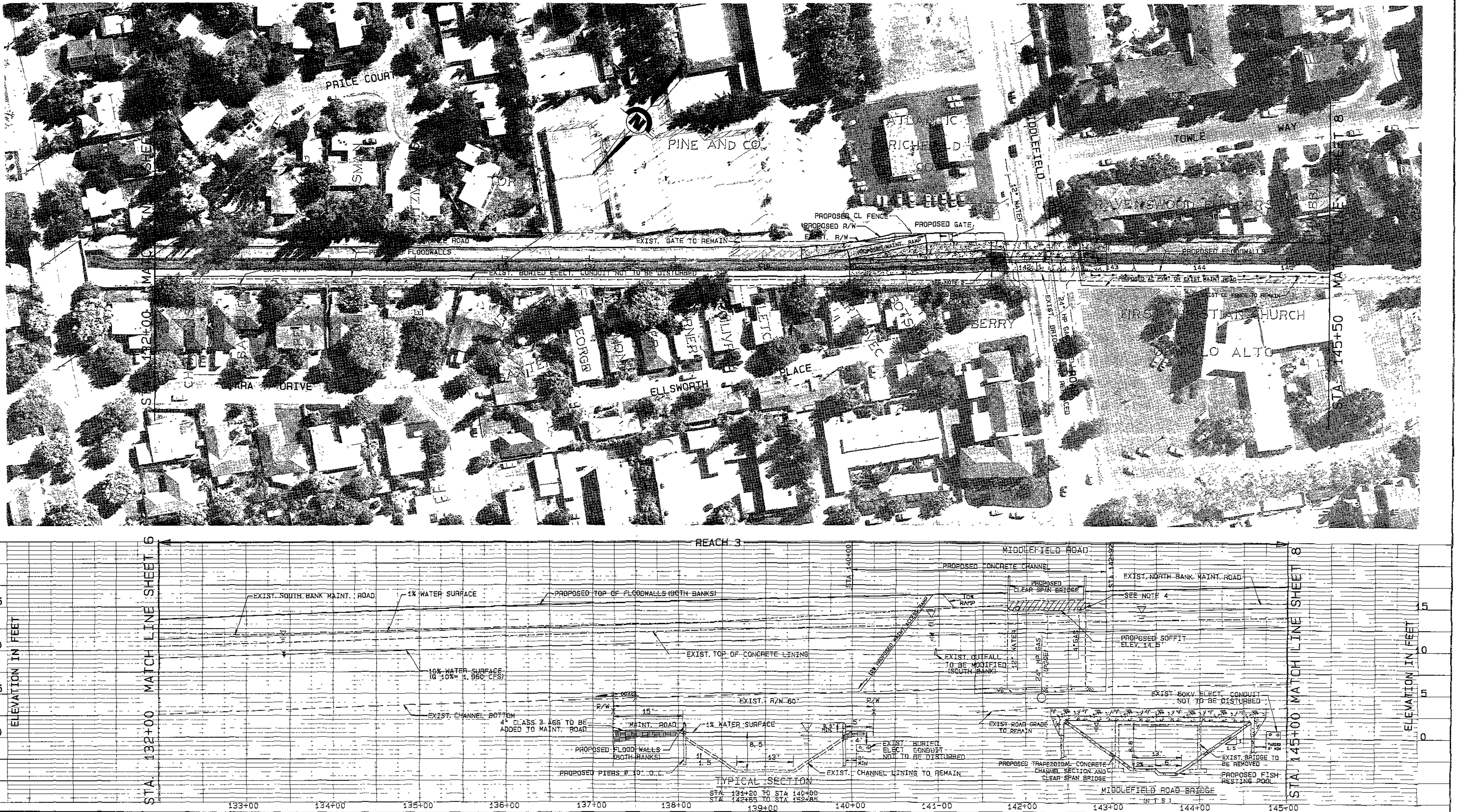
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25063

ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=5
V: 1"=5
SHEET
6


PRICE COURT
PINE AND CO
ATLANTIC RICHFIELD CO
MIDDLEFIELD
TOWLE WAY
RAVENSWOOD BUILDERS
FIRST CHRISTIAN CHURCH
PALO ALTO
BERRY
ELLSWORTH PLACE
CLARA DRIVE
MAINT. ROAD
PROPOSED FLOODWALLS
EXIST. GATE TO REMAIN
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED
PROPOSED CL FENCE
PROPOSED R/W
EXIST. R/W
PROPOSED GATE
PROPOSED MAINT. RAMP
12" WATER
SEE NOTE 2
PROPOSED FISH RESTING POOL
EXIST. BRIDGE TO BE REMOVED
24" HP GAS
PROPOSED AC PVMT ON EXIST MAINT ROAD
EXIST CL FENCE TO REMAIN
142
143
144
145
STA. 132+00
STA. 145+50
MATCH LINE SHEET 6
MATCH LINE SHEET 8
REACH 3
MIDDLEFIELD ROAD
STA. 140+00
STA. 142+92
PROPOSED CONCRETE CHANNEL
PROPOSED CLEAR SPAN BRIDGE
EXIST. NORTH BANK MAINT. ROAD
SEE NOTE 4
EXIST. SOUTH BANK MAINT. ROAD
1% WATER SURFACE
PROPOSED TOP OF FLOODWALLS (BOTH BANKS)
10% RAMP
10% PROPOSED MAINT. ACCESS RAMP
PROPOSED SOFFIT ELEV. 14.5
EXIST. TOP OF CONCRETE LINING
EXIST. OUTFALL TO BE MODIFIED (SOUTH BANK)
12" WATER
24" HP GAS (PG&E)
4" GAS
10% WATER SURFACE (Q 10%= 1,960 CFS)
EXIST. CHANNEL BOTTOM
ELEVATION IN FEET
15
10
5
0
S=.00323
R/W
15'
EXIST. R/W 60'
4" CLASS 3 AGG TO BE ADDED TO MAINT. ROAD
MAINT. ROAD
1% WATER SURFACE
PROPOSED FLOOD WALLS (BOTH BANKS)
PROPOSED PIERS @ 10' O.C.
8.5'
13'
1
1.5
2.5' MIN
5'
4'
2' MIN
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST. CHANNEL LINING TO REMAIN
TYPICAL SECTION
STA. 131+20 TO STA 140+00
STA. 142+65 TO STA 152+85
EXIST 60KV ELECT. CONDUIT NOT TO BE DISTURBED
EXIST ROAD GRADE TO REMAIN
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
EXIST. BRIDGE TO BE REMOVED
PROPOSED FISH RESTING POOL
2%
6'
MIDDLEFIELD ROAD BRIDGE
(N.T.S.)
133+00
134+00
135+00
136+00
137+00
138+00
139+00
140+00
141+00
142+00
143+00
144+00
145+00

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES
1. WATER SURFACE PROFILE BASED ON Q1%=3,500 CFS; N=0.015.
2. SEDIMENT DEPTH AND STAGE MARKER TO BE ADDED TO PROPOSED LINING DOWNSTREAM OF MIDDLEFIELD ROAD.
3. SECTIONS VIEWED LOOKING UPSTREAM.
4. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVES AT UPSTREAM AND DOWNSTREAM FACES.

PHOTOGRAPHY BY AIR FLIGHT SERVICE 10-28-85 RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN KWW
DRAWN CAM
CHECKED KWW

Santa Clara Valley Water District

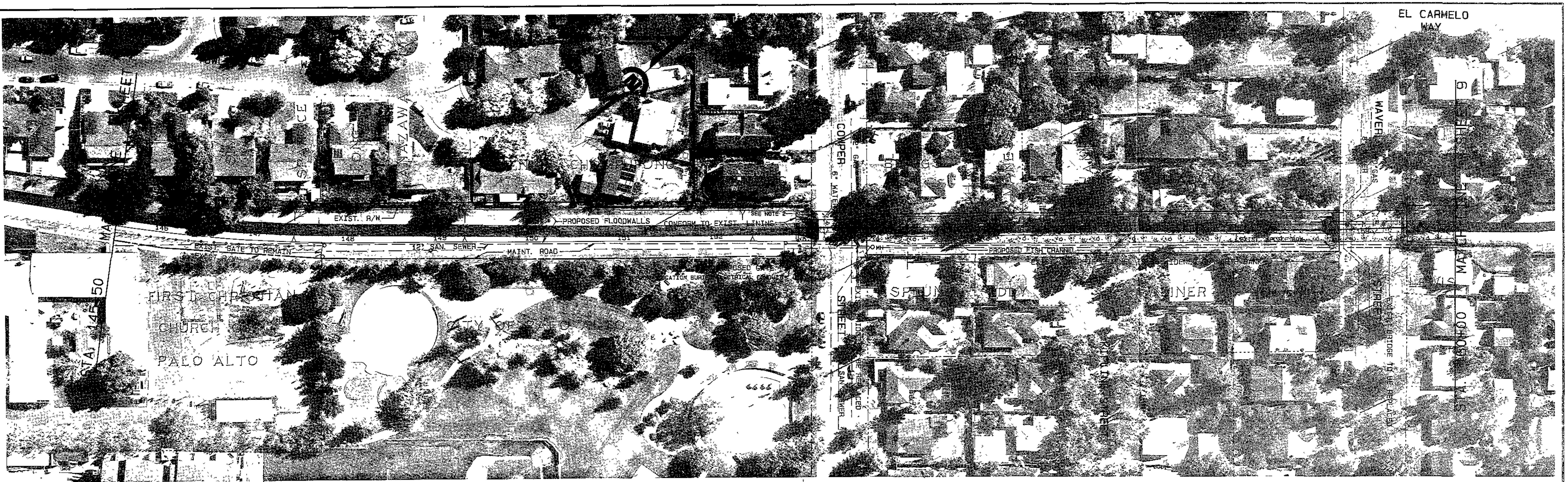
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 30683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

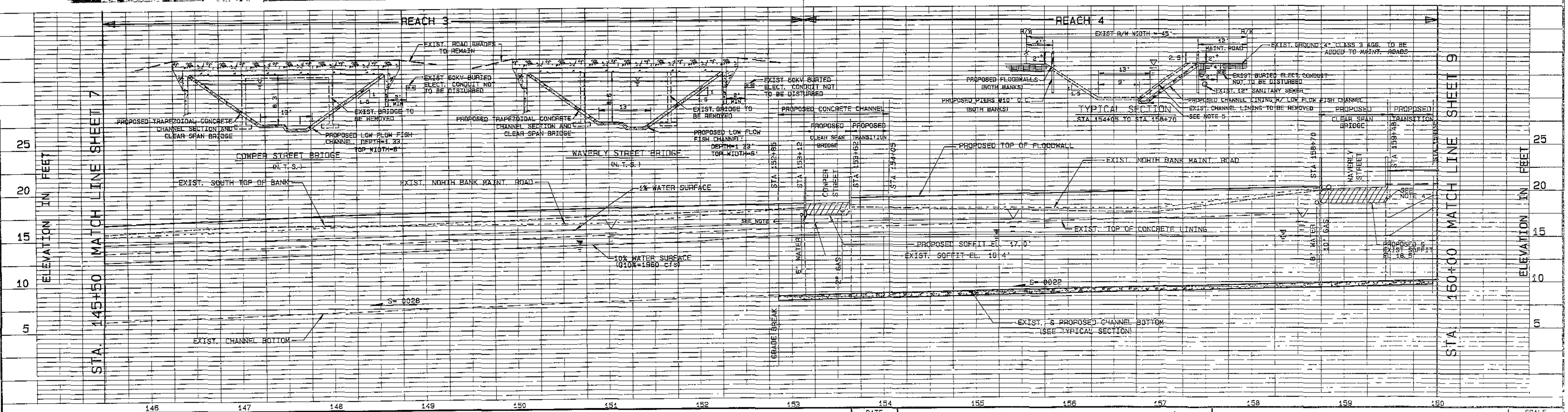
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET 7




REACH 3
REACH 4
EXIST. ROAD GRADES TO REMAIN
EXIST 60KV BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST. BRIDGE TO BE REMOVED
PROPOSED TRAPEZOIDAL CONCRETE CHANNEL SECTION AND CLEAR SPAN BRIDGE
PROPOSED LOW FLOW FISH CHANNEL: DEPTH=1.33' TOP WIDTH=6'
COWPER STREET BRIDGE (N.T.S.)
WAVERLY STREET BRIDGE (N.T.S.)
PROPOSED CONCRETE CHANNEL
PROPOSED CLEAR SPAN BRIDGE
PROPOSED TRANSITION
EXIST R/W WIDTH = 45'
EXIST. GROUND 4" CLASS 2 AGG. TO BE ADDED TO MAINT. ROADS
MAINT. ROAD
PROPOSED FLOODWALLS (BOTH BANKS)
PROPOSED PIERS @10' O.C. (BOTH BANKS)
EXIST. BURIED ELECT. CONDUIT NOT TO BE DISTURBED
EXIST. 12" SANITARY SEWER
PROPOSED CHANNEL LINING W/ LOW FLOW FISH CHANNEL
EXIST. CHANNEL LINING TO BE REMOVED
SEE NOTE 5
TYPICAL SECTION
STA. 154+05 TO STA. 158+70
STA. 152+95
STA. 153+12
STA. 153+62
STA. 154+05
STA. 158+70
STA. 159+48
COWPER STREET
WAVERLY STREET
PROPOSED TOP OF FLOODWALL
EXIST. NORTH BANK MAINT. ROAD
EXIST. SOUTH TOP OF BANK
1% WATER SURFACE
10% WATER SURFACE (Q10%=1960 cfs)
SEE NOTE 4
EXIST. TOP OF CONCRETE LINING
PROPOSED SOFFIT EL. 17.0'
EXIST. SOFFIT EL. 16.4'
PROPOSED & EXIST. SOFFIT EL. 18.5'
6" WATER
2" GAS
8" WATER
10" GAS
S= .0028
S= .0022
GRADE BREAK
EXIST. CHANNEL BOTTOM
EXIST. & PROPOSED CHANNEL BOTTOM (SEE TYPICAL SECTION)
ELEVATION IN FEET
STA. 145+50 MATCH LINE SHEET 7
STA. 160+00 MATCH LINE SHEET 9
5
10
15
20
25
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES:

1. WATER SURFACE BASED ON Q1%=3,500 CFS; N= 015
2. SEDIMENT AND STAGE MARKERS TO BE ADDED TO PROPOSED LINING DOWNSTREAM OF COWPER AND WAVERLY STREETS.
3. SECTIONS VIEWED LOOKING UPSTREAM
4. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVE AT UPSTREAM AND DOWNSTREAM FACES.
5. PROPOSED NORTH BANK CHANNEL WIDENING SHALL INCLUDE LOW FLOW FISH CHANNEL AND CONFORM TO COWPER AND WAVERLY BRIDGES.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: 10-28-85 RECTIFICATION BY

DATE
2-1-88
DESIGN
KWW
DRAWN
CAM
CHECKED
KWW

Santa Clara Valley Water District

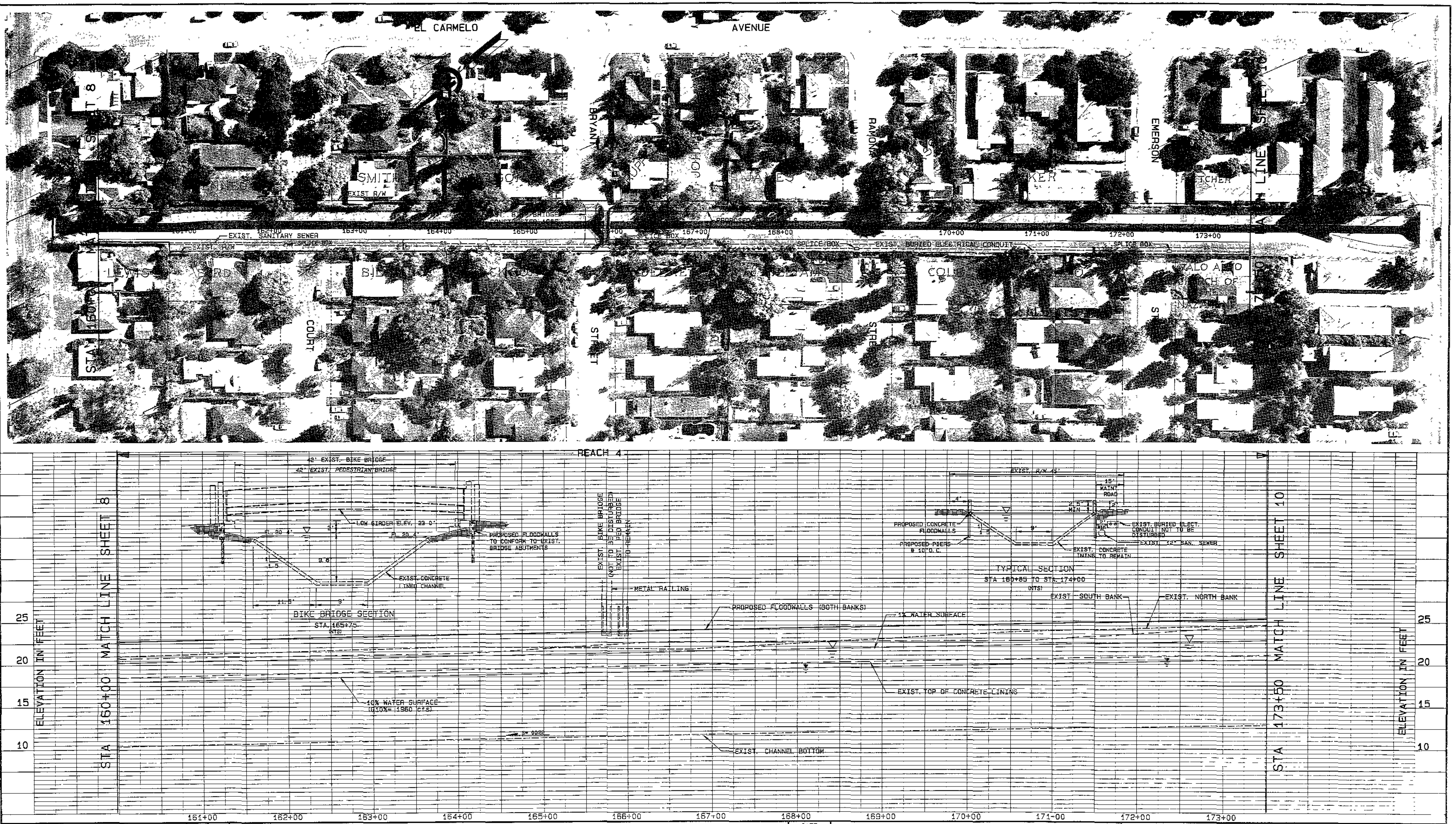
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35883
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
8



REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES
1. WATER SURFACE BASED ON Q1%=3500 CFS; N=.015
2. SECTIONS VIEWED LOOKING UPSTREAM.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE 10-28-85 RECTIFICATION BY:

DATE 2-1-88
DESIGN KWW
DRAWN CAM/SW
CHECKED KWW

Santa Clara Valley Water District

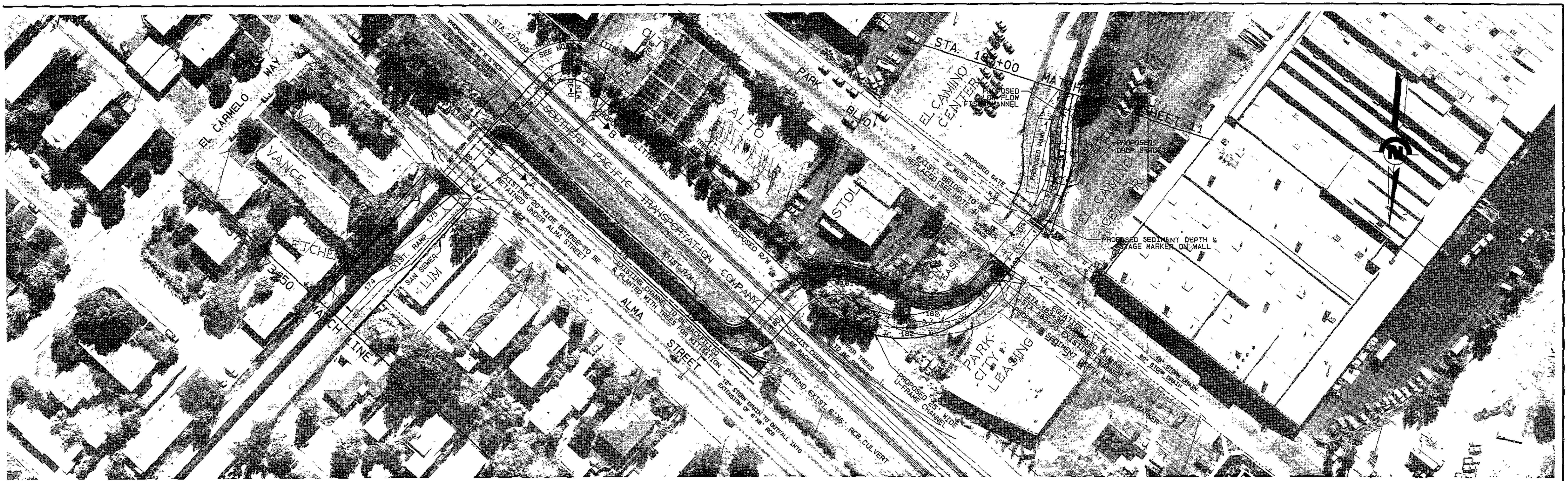
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35863
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

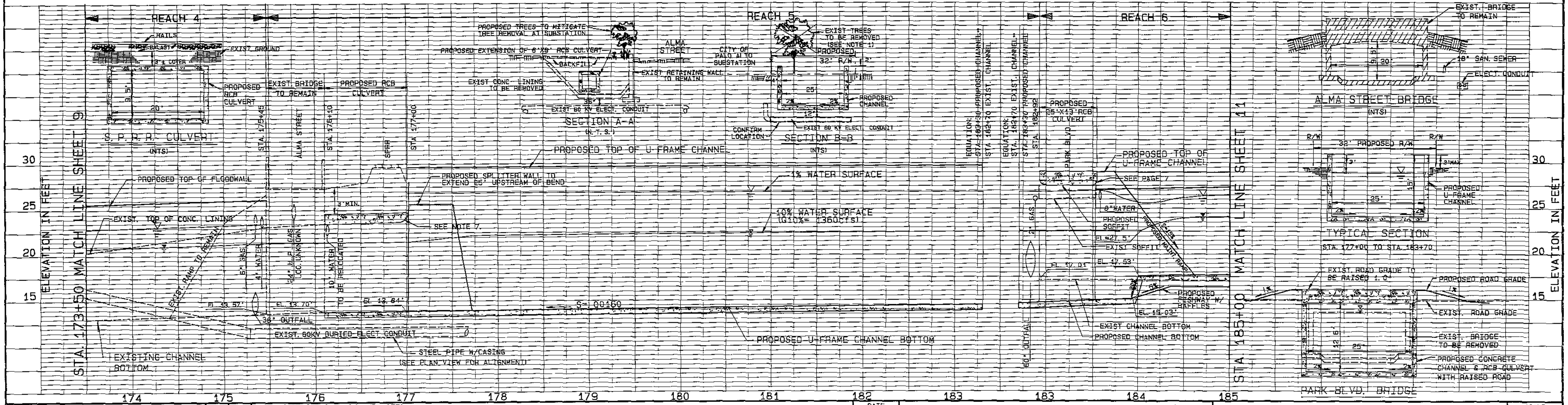
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
9


EL CARMELO WAY
VANCE
ALMA STREET
PARK BLVD
SOUTHERN PACIFIC TRANSPORTATION COMPANY
EL CAMINO CENTER
PARK CITY LEASING
STA. 177+00
STA. 183+00
MATCH LINE
MATCH LINE SHEET 11
EXISTING 20' WIDE BRIDGE TO BE RETAINED UNDER ALMA STREET
EXISTING CHANNEL TO BE BACKFILLED & PLANTED WITH TREES FOR MITIGATION
PROPOSED R/W
PROPOSED 25' WIDE U-FRAME CHANNEL
EXTEND EXIST. 6'X6' RCB CULVERT
12" STORM DRAIN TO OUTFALL INTO EXTENSION OF 6'X6' RCB
EXIST. BRIDGE TO BE REPLACED (SEE NOTE 4)
PROPOSED GATE
PROPOSED LOW FLOW FISH CHANNEL
PROPOSED DROP STRUCTURE
PROPOSED SEDIMENT DEPTH & STAGE MARKER ON WALL
EQUATION
18" STORM DRAIN
60" STORM DRAIN
EXIST. RAMP
SAN SEWER
N


REACH 4
REACH 5
REACH 6
RAILS
BALAST
EXIST GROUND
3'± COVER
PROPOSED RCB CULVERT
9.5'
20'
S. P. R. R. CULVERT
(NTS)
EXIST. BRIDGE TO REMAIN
PROPOSED RCB CULVERT
STA. 175+45
ALMA STREET
STA. 176+10
SPRR
STA. 177+00
PROPOSED TREES TO MITIGATE TREE REMOVAL AT SUBSTATION
PROPOSED EXTENSION OF 6'X6' RCB CULVERT
BACKFILL
ALMA STREET
CITY OF PALO ALTO SUBSTATION
EXIST RETAINING WALL TO REMAIN
EXIST CONC. LINING TO BE REMOVED
36'
EXIST 60 KV ELECT. CONDUIT
SECTION A-A
(N. T. S.)
EXIST TREES TO BE REMOVED (SEE NOTE 1)
PROPOSED 32' R/W
25'
2%
12'
PROPOSED CHANNEL
CONFIRM LOCATION
EXIST 60 KV ELECT. CONDUIT
SECTION B-B
(NTS)
EQUATION: STA. 183+30 PROPOSED CHANNEL= STA 182+70 EXIST. CHANNEL
EQUATION: STA. 182+70 EXIST. CHANNEL= STA. 183+30 PROPOSED CHANNEL
STA 182+92
PROPOSED 25'X13' RCB CULVERT
PARK BLVD
PROPOSED TOP OF U-FRAME CHANNEL
SEE PAGE 7
8" WATER
PROPOSED SOFFIT
EL=27.5'
EXIST SOFFIT
PROPOSED MAINT. RAMP
S=15%
EL. 17.01'
EL. 17.53'
PROPOSED FISHWAY W/ BAFFLES
EL. 15.03'
EXIST CHANNEL BOTTOM
PROPOSED CHANNEL BOTTOM
2" GAS
60" OUTFALL
STA. 173+50 MATCH LINE SHEET 9
STA. 185+00 MATCH LINE SHEET 11
ELEVATION IN FEET
30
25
20
15
PROPOSED TOP OF U-FRAME CHANNEL
PROPOSED TOP OF FLOODWALL
EXIST. TOP OF CONC. LINING
EXIST. RAMP TO REMAIN
6" GAS
4" WATER
24" H.P. GAS LOC. UNKNOWN
10" WATER TO BE RELOCATED
3' MIN.
SEE NOTE 7.
PROPOSED SPLITTER WALL TO EXTEND 25' UPSTREAM OF BEND
1% WATER SURFACE
10% WATER SURFACE (Q10%= 1360cfs)
EL. 13.57'
EL. 13.70'
EL. 13.84'
36" OUTFALL
S=.00160
EXIST. 60KV BURIED ELECT CONDUIT
STEEL PIPE W/CASING (SEE PLAN VIEW FOR ALIGNMENT)
EXISTING CHANNEL BOTTOM
PROPOSED U-FRAME CHANNEL BOTTOM
EXIST. BRIDGE TO REMAIN
9.5'
20'
18" SAN. SEWER
ELECT. CONDUIT
ALMA STREET BRIDGE
(NTS)
R/W
32' PROPOSED R/W
3'
2' MAX
15'
25'
PROPOSED U-FRAME CHANNEL
TYPICAL SECTION
STA. 177+00 TO STA. 183+70
EXIST. ROAD GRADE TO BE RAISED 1.0'
PROPOSED ROAD GRADE
1%
EXIST. ROAD GRADE
12.6'
EXIST. BRIDGE TO BE REMOVED
PROPOSED CONCRETE CHANNEL & RCB CULVERT WITH RAISED ROAD
PARK BLVD. BRIDGE
174
175
176
177
178
179
180
181
182
183
183
184
185

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES:

1. EXISTING TREES TO BE REMOVED ADJACENT TO CITY OF PALO ALTO SUBSTATION & MITIGATED W/ PLANTING ADJACENT TO ALMA STREET
2. EXISTING CHANNEL TO BE REMOVED AND BACKFILLED BETWEEN STA. 176+25 AND STA 183+00.
3. WATER SURFACE UPSTREAM ALMA STREET BASED ON Q1%=3100 cfs, N=.015
4. PARK BLVD. ROAD GRADE TO BE RAISED APPROXIMATELY 1.0 FEET AT MATADERO CREEK
5. SECTIONS VIEWED LOOKING UPSTREAM
6. PROPOSED TRANSITION SHALL INCLUDE SPLITTER WALL AND UTILIZE MAXIMUM POSSIBLE RADIUS AT BEND.
7. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVE AT UPSTREAM AND DOWNSTREAM FACES.

PHOTOGRAPHY BY: AIR FLIGHT SERVICE DATE: RECTIFICATION BY:

DATE 2-1-88
DESIGN KWW
DRAWN L. HILL
CHECKED KWW

Santa Clara Valley Water District

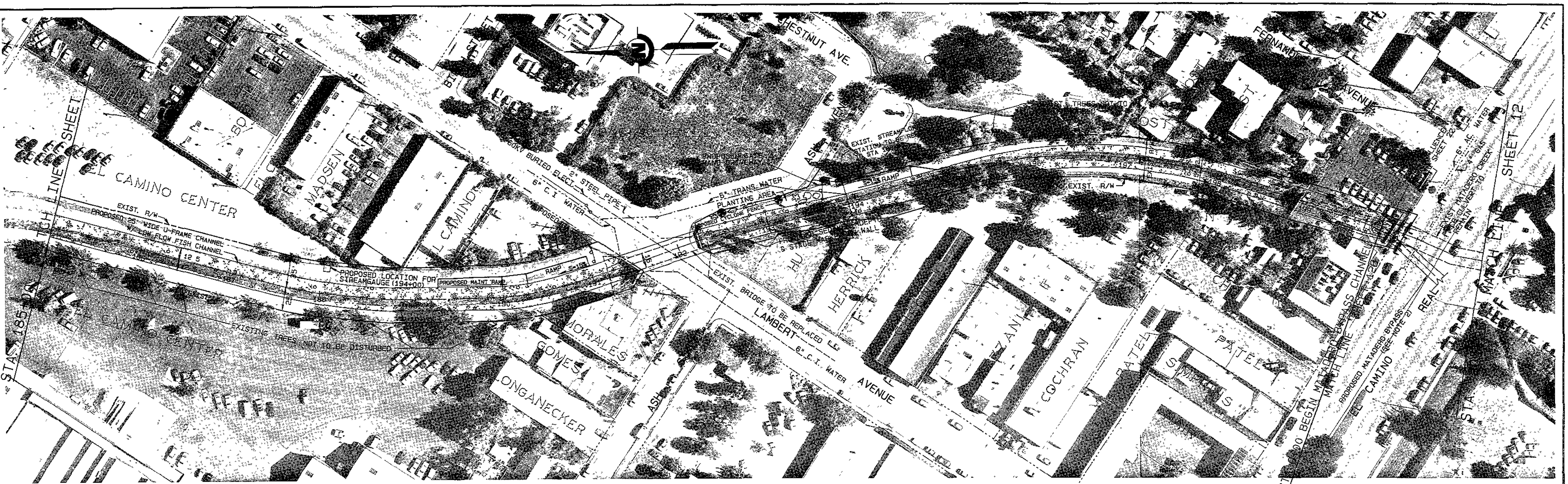
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25050

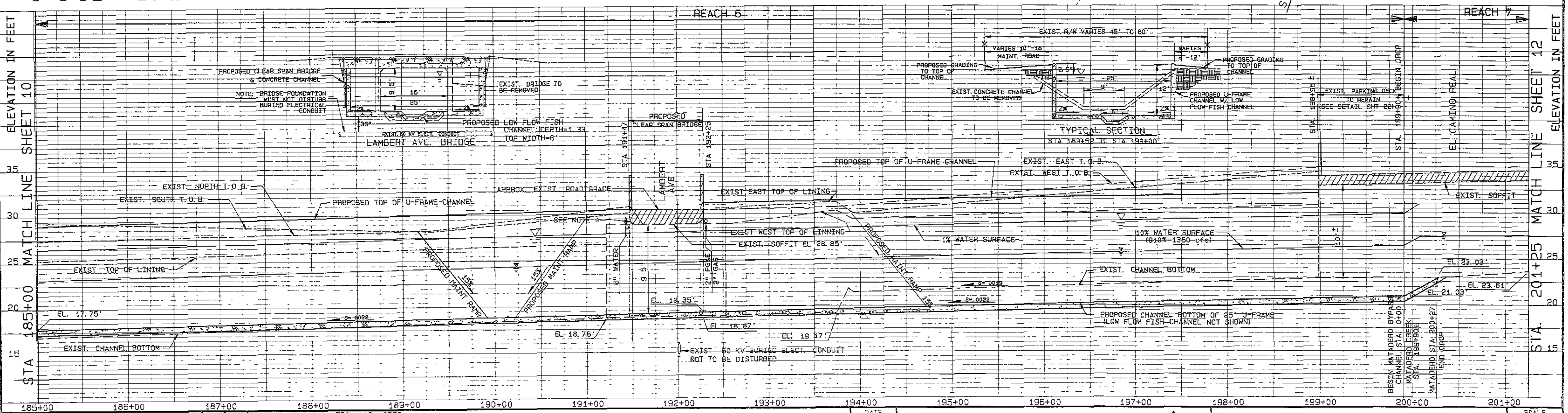
ENGINEERING APPROVAL
Stan Wolfe
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET 10


EL CAMINO CENTER
EXIST. R/W
PROPOSED 25' WIDE U-FRAME CHANNEL W/ LOW FLOW FISH CHANNEL
PROPOSED LOCATION FOR STREAMGAUGE (194+00)
PROPOSED MAINT RAMP
EXISTING TREES NOT TO BE DISTURBED
60KV BURIED ELECT.
2" STEEL PIPE
6" C.I. WATER
6" TRANS. WATER
PLANTING AREA
EXIST. BRIDGE TO BE REPLACED
LAMBERT AVENUE
6" C.I. WATER
CHESTNUT AVE.
EXIST. STREAMFLOW STATION TO BE
EXIST. R/W
MADSEN
EL CAMINO
MORALES
GOMES
LONGANECKER
HERRICK
COCHRAN
PATEL
FERNANDO AVENUE
STA 185+00 MATCH LINE SHEET 10
STA 199+00 BEGIN MATADERO BYPASS CHANNEL
PROPOSED MATADERO BYPASS CHANNEL
EL CAMINO REAL
MATCH LINE SHEET 12


REACH 6
REACH 7
ELEVATION IN FEET
STA 185+00 MATCH LINE SHEET 10
STA 201+25 MATCH LINE SHEET 12
PROPOSED CLEAR SPAN BRIDGE & CONCRETE CHANNEL
NOTE: BRIDGE FOUNDATION MUST NOT DISTURB BURIED ELECTRICAL CONDUIT
EXIST. BRIDGE TO BE REMOVED
16'
25'
9.5'
35'
EXIST. 60 KV ELECT. CONDUIT
LAMBERT AVE. BRIDGE
PROPOSED LOW FLOW FISH CHANNEL DEPTH=1.33' TOP WIDTH=6'
PROPOSED CLEAR SPAN BRIDGE
STA 191+47
STA 192+25
EXIST. R/W VARIES 45' TO 60'
VARIES 10'-18' MAINT. ROAD
VARIES 3'-12'
PROPOSED GRADING TO TOP OF CHANNEL
EXIST. CONCRETE CHANNEL TO BE REMOVED
PROPOSED U-FRAME CHANNEL W/ LOW FLOW FISH CHANNEL
TYPICAL SECTION
STA 183+52 TO STA 199+00
EXIST. PARKING DECK TO REMAIN SEE DETAIL SHT 22
STA. 198+95±
STA. 199+00 BEGIN DROP
EL CAMINO REAL
PROPOSED TOP OF U-FRAME CHANNEL
EXIST. EAST T.O.B.
EXIST. WEST T.O.B.
EXIST. NORTH T.O.B.
EXIST. SOUTH T.O.B.
PROPOSED TOP OF U-FRAME CHANNEL
APPROX. EXIST. ROADGRADE
LAMBERT AVE
EXIST. EAST TOP OF LINING
SEE NOTE 4
EXIST. WEST TOP OF LINNING
EXIST. SOFFIT EL 28.85'
1% WATER SURFACE
10% WATER SURFACE (Q10%=1360 cfs)
EXIST. SOFFIT
PROPOSED MAINT RAMP 15%
PROPOSED MAINT RAMP 15%
PROPOSED MAINT RAMP 15%
EXIST. TOP OF LINING
6" WATER
2" P&E
2" GAS
EXIST. CHANNEL BOTTOM
EL. 23.03'
EL. 23.61'
EL. 21.03'
S=.0022
EL. 17.75'
EL. 18.76'
EL. 19.35'
EL. 18.87'
EL. 19.17'
PROPOSED CHANNEL BOTTOM OF 25' U-FRAME (LOW FLOW FISH CHANNEL NOT SHOWN)
EXIST. CHANNEL BOTTOM
EXIST. 60 KV BURIED ELECT. CONDUIT NOT TO BE DISTURBED
BEGIN MATADERO BYPASS CHANNEL STA. 0+00
MATADERO CREEK STA. 199+90±
MATADERO STA. 200+27 END DROP
15
20
25
30
35
185+00
186+00
187+00
188+00
189+00
190+00
191+00
192+00
193+00
194+00
195+00
196+00
197+00
198+00
199+00
200+00
201+00

REV	DESCRIPTION	DATE	APPR.

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES

1. WATER SURFACE DOWNSTREAM OF EL CAMINO REAL BASED ON Q1%=3100 CFS. n= 015
2. Q1%=1300 CFS IN MATADERO CREEK; Q1%=1700 CFS IN MATADERO BYPASS CHANNEL (UPSTREAM OF EL CAMINO REAL).
3. SECTIONS VIEWED LOOKING UPSTREAM
4. BRIDGE SOFFIT SHALL INCLUDE 1-FOOT RADIUS CURVE AT UPSTREAM AND DOWNSTREAM FACES
5. LOW FLOW FISH CHANNEL TO EXTEND TO EXIST. MATADERO CREEK RCB CULVERT (SEE DETAIL SHEET 22).

PHOTOGRAPHY BY: AIR FLIGHT SERVICE

DATE: 10-28-85

RECTIFICATION BY:

DATE
2-1-88
DESIGN
KWW
DRAWN
L HILL
CHECKED
KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith W Whitman
PROJECT ENGINEER R.C.E. NO. 35683
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25083

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

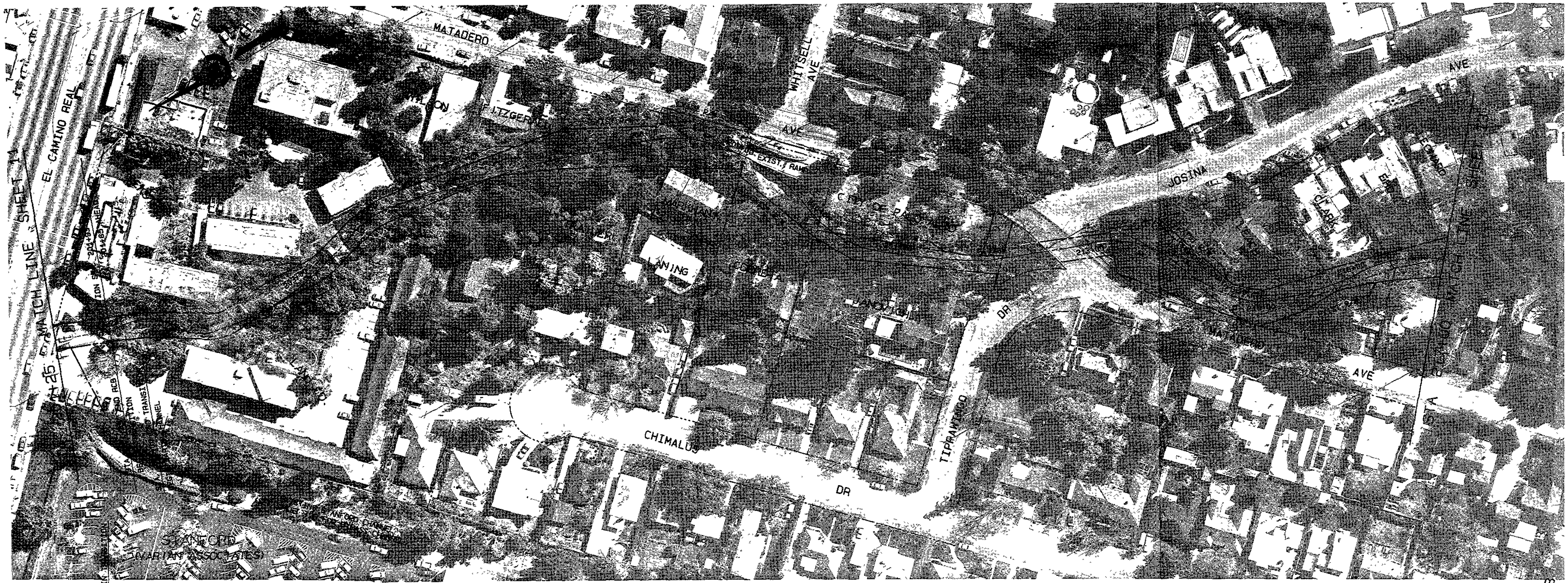
MATADERO CREEK

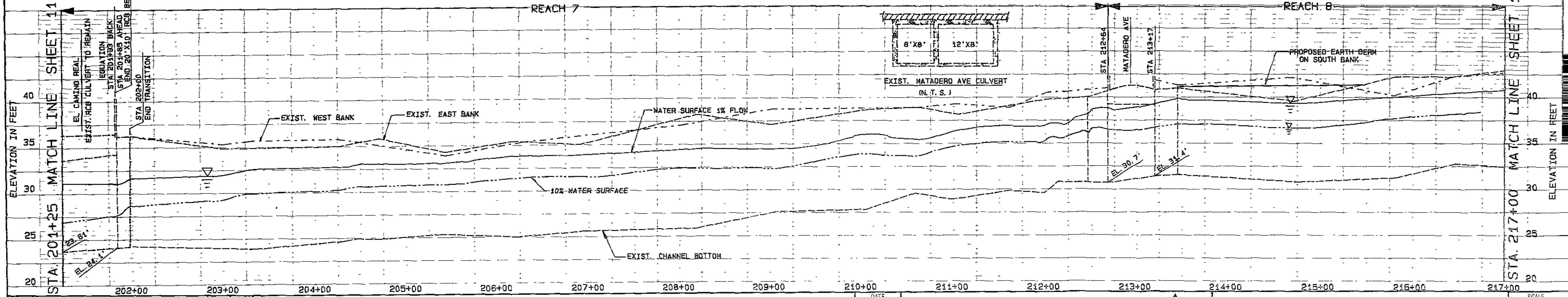
GENERAL PLAN

FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H. 1"=50'
V. 1"=5'

SHEET
11





REV.	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. 10% WATER SURFACE BASED ON Q=1300 CFS; N=.035
2. 10% FLOW WATER SURFACE BASED ON Q=700 CFS.
3. EXISTING SACKED CONCRETE WEIRS TO BE REMOVED & REPLACED WITH GROUTED

PHOTOGRAPHY BY AIR FLIGHT SERVICE

DATE 2-27-86

RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN SEB
DRAWN SEB
CHECKED KWN

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 15083
Randy Talley
DIVISION ENGINEER R.C.E. NO. 22290

ENGINEERING APPROVAL
Stan Wolfe
MGR. PROJECT DEVELOPMENT BRANCH R.C.E. NO. 22474

MATADERO CREEK

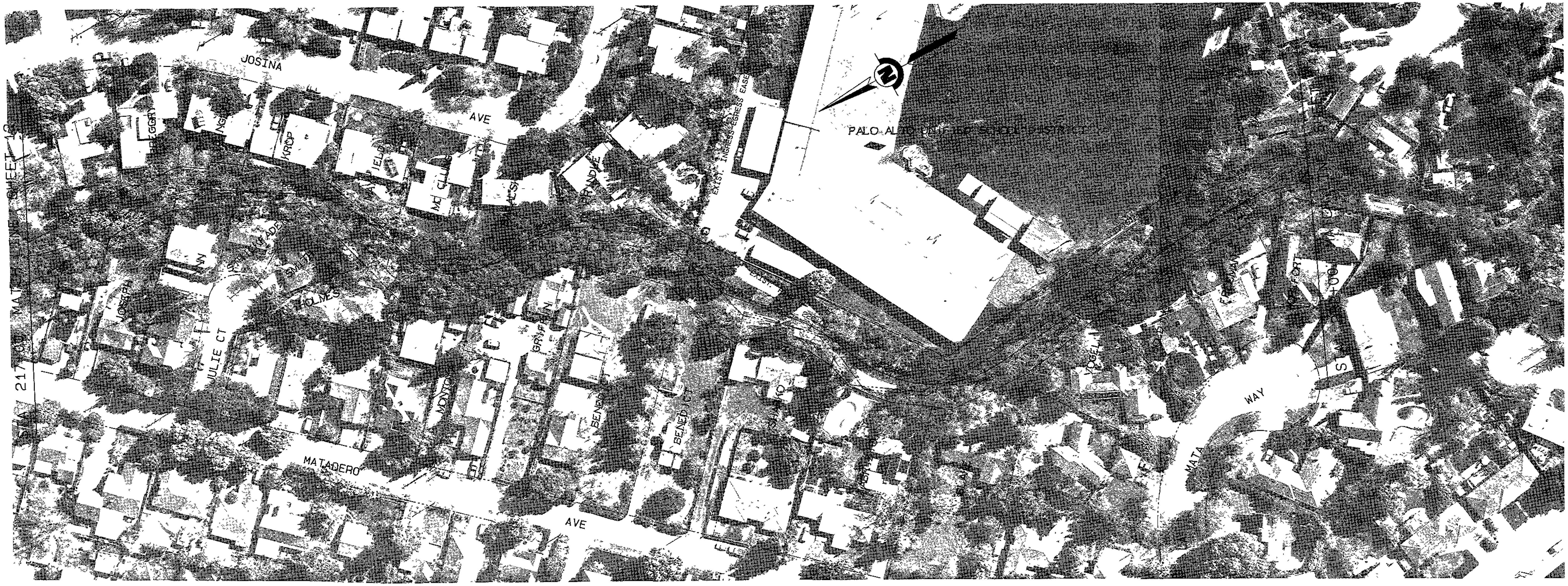
GENERAL PLAN

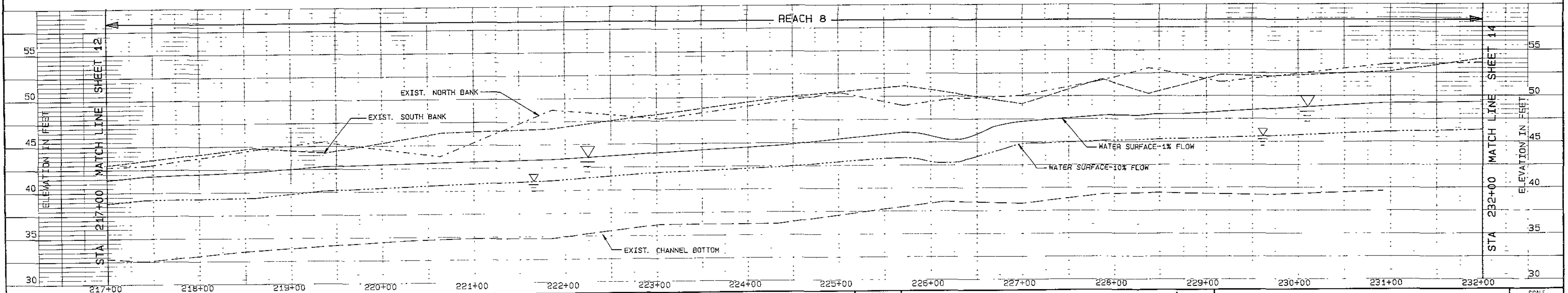
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
12

LETTERS OF COMMENT





REV	DESCRIPTION	DATE	APPR

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES
1. 1% WATER SURFACE BASED ON Q=1300 CFS; N=.040.
2 10% FLOW WATER SURFACE BASED ON Q=700 CFS D/S OF STA 223+03 & Q=560 CFS UPSTREAM

PHOTOGRAPHY BY AIR FLIGHT SERVICE

DATE 2-27-86

RECTIFICATION BY AIR FLIGHT SERVICE

DATE
2-1-88
DESIGN
SEB
DRAWN
KEM
CHECKED
KWW

Santa Clara Valley Water District

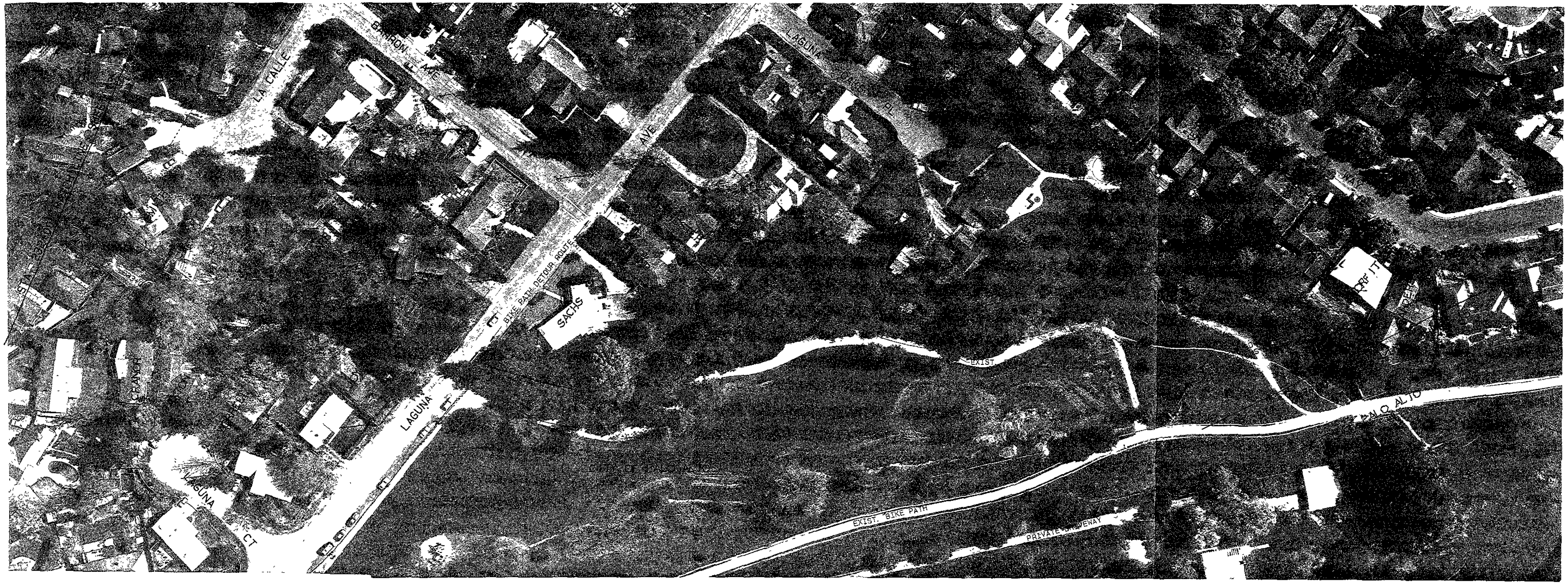
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

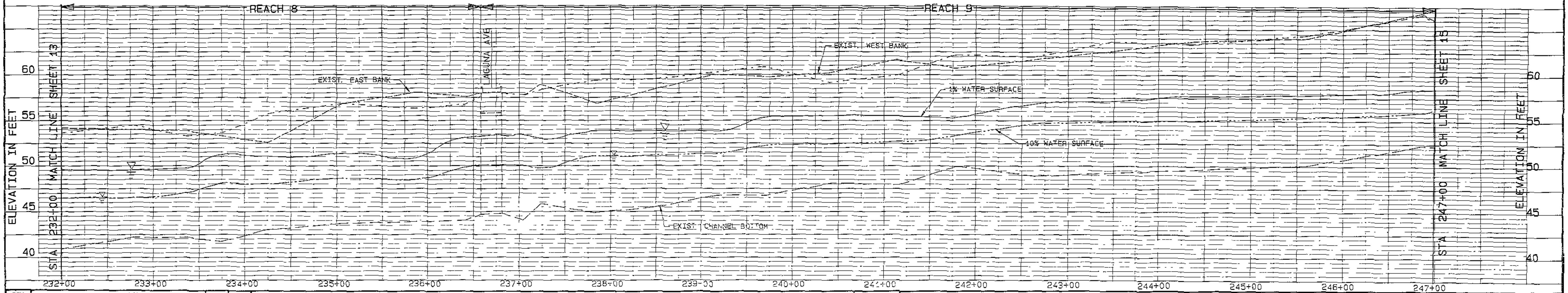
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
13





REV.	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1 1% WATER SURFACE BASED ON Q=1300CFS, N= 035 & 10% WATER SURFACE BASED ON Q=560CFS
2 EXISTING SACKED CONCRETE WEIRS TO BE REMOVED & REPLACED WITH GROUTED ROCK CROSS CHANNEL STABILIZERS
2. EXISTING SACKED CONCRETE WEIRS TO BE REMOVED & REPLACED WITH GROUTED ROCK CROSS CHANNEL STABILIZERS OR V-NOTCH LOG WEIRS

PHOTOGRAPHY BY AIR FLIGHT SERVICE DATE 2-27-86 RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2/1/88
DESIGN SEB
DRAWN KEM
CHECKED KWW

Santa Clara Valley Water District

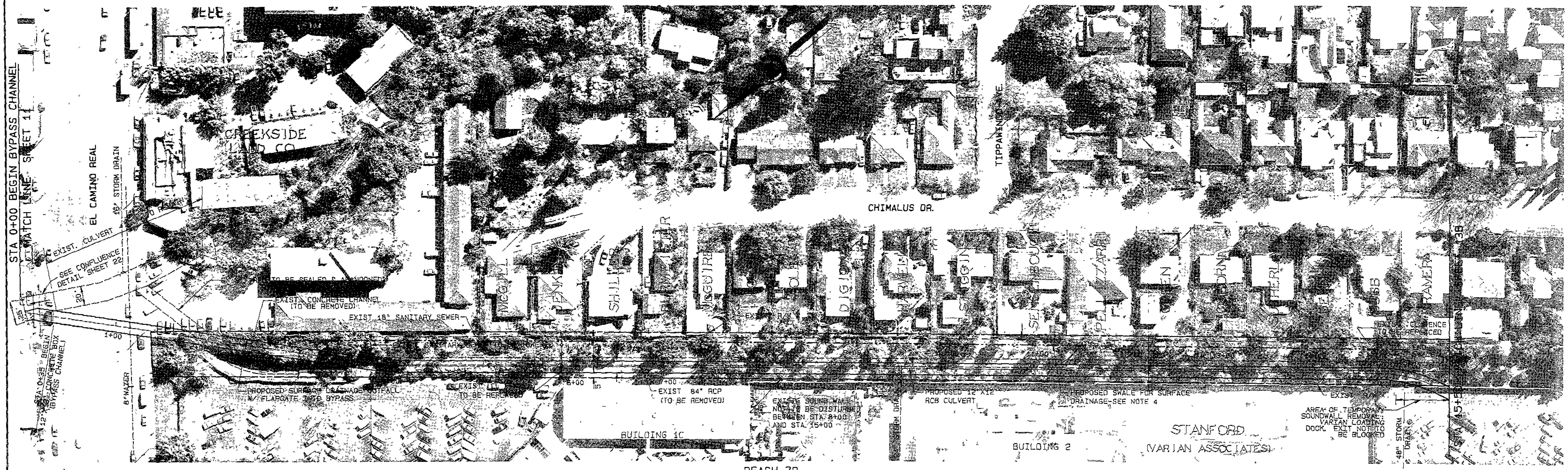
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R. C. E. NO. 25663
Randy Talley
DIVISION ENGINEER R. C. E. NO 25093

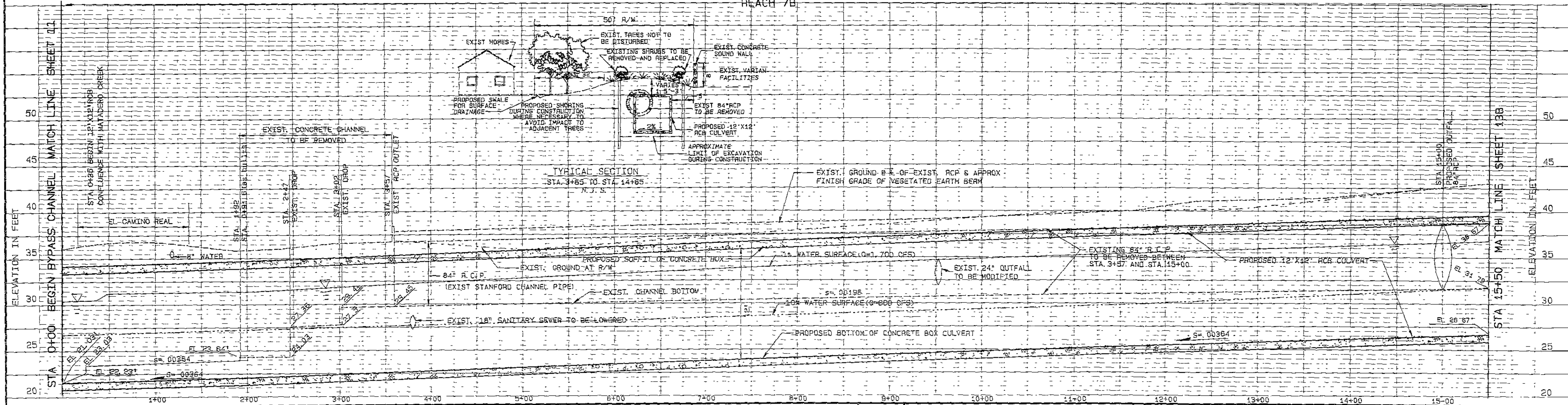
ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R. C. E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
h. 1"=50'
V. 1"=5'

SHEET
14


STA 0+00 BEGIN BYPASS CHANNEL
MATCH LINE SHEET 11
EL CAMINO REAL
16" STORM DRAIN
EXIST. CULVERT
SEE CONFLUENCE DETAIL SHEET 22
20'
25'
STA 0+35 BEGIN 12'X12' CONCRETE BOX (BYPASS CHANNEL)
8" WATER
1+00
CREEKSIDE LAND CO
TO BE SEALED & ABANDONED
EXIST. CONCRETE CHANNEL (TO BE REMOVED)
EXIST 18" SANITARY SEWER
PROPOSED SURFACE DRAINAGE OUTFALL W/ FLAPGATE INTO BYPASS
EXIST. TO BE REPLACED
EXIST 84" RCP (TO BE REMOVED)
BUILDING 1C
EXIST. SOUND WALL NOT TO BE DISTURBED BETWEEN STA. 8+00 AND STA. 15+00
STORM DRAIN
PROPOSED 12'X12' RCB CULVERT
PROPOSED SWALE FOR SURFACE DRAINAGE-SEE NOTE 4
BUILDING 2
STANFORD
(VARIAN ASSOCIATES)
AREA OF TEMPORARY SOUNDWALL REMOVAL. VARIAN LOADING DOCK. EXIT NOT TO BE BLOCKED
48" STORM DRAIN
EXIST. R/W
EXIST. CL FENCE TO BE REPLACED
STA 15+50
CHIMALUS DR.
TIPPAWINGO AVE.
MCGUIRE
JENKINS
SHULER
SGUIRE
DIGIO
HARVEY
STANFORD
SEKHUSCH
PEZZARI
COEN
CORDINA
FREIBERG
TRAVER


REACH 7B
50' R/W
EXIST HOMES
EXIST. TREES NOT TO BE DISTURBED
EXISTING SHRUBS TO BE REMOVED AND REPLACED
EXIST. CONCRETE SOUND WALL
EXIST. VARIAN FACILITIES
32'
VARIES 1.5'-3'
8'
5'
2%
PROPOSED SWALE FOR SURFACE DRAINAGE
PROPOSED SHORING DURING CONSTRUCTION WHERE NECESSARY TO AVOID IMPACT TO ADJACENT TREES
EXIST 84" RCP TO BE REMOVED
PROPOSED 12'X12' RCB CULVERT
APPROXIMATE LIMIT OF EXCAVATION DURING CONSTRUCTION
TYPICAL SECTION
STA. 3+65 TO STA. 14+65
N.T.S.
STA 0+00 BEGIN BYPASS CHANNEL MATCH LINE SHEET 11
STA 0+35 BEGIN 12'X12' RCB CONFLUENCE WITH MATADERO CREEK
EL CAMINO REAL
EXIST. CONCRETE CHANNEL TO BE REMOVED
STA. 1+92
STA. 0+91.6 (95 bullts)
STA. 2+47 EXIST. DROP
STA. 3+02 EXIST. DROP
STA. 3+57 EXIST. RCP OUTLET
8" WATER
84" R.C.P. (EXIST STANFORD CHANNEL PIPE)
EXIST. GROUND AT R/W
PROPOSED SOFFIT OF CONCRETE BOX
EXIST. CHANNEL BOTTOM
EXIST. 18" SANITARY SEWER TO BE LOWERED
EL 21.03
EL 23.03
EL 22.23
EL 23.64
S=.00364
27.36
27.3
29.43
29.45
24.03
EXIST. GROUND @ CL OF EXIST. RCP & APPROX FINISH GRADE OF VEGETATED EARTH BERM
1% WATER SURFACE (Q=1,700 CFS)
10% WATER SURFACE (Q=680 CFS)
S=.00196
EXIST. 24" OUTFALL TO BE MODIFIED
EXISTING 84" R.C.P. TO BE REMOVED BETWEEN STA. 3+57 AND STA. 15+00
PROPOSED 12'X12' RCB CULVERT
PROPOSED BOTTOM OF CONCRETE BOX CULVERT
STA 15+00 PROPOSED OUTFALL 84" RCP
EL 36.67
EL 31.79
EL 26.67
STA 15+50 MATCH LINE SHEET 13B
ELEVATION IN FEET
20
25
30
35
40
45
50
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
15+00

REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES:

1. BYPASS CHANNEL Q1%=1,700 CFS DOWNSTREAM OF STANFORD CHANNEL OUTFALL, n=.015
2. CONSTRUCTION ACCESS FROM VARIAN NOT PERMITTED BETWEEN STA. 6+00 AND STA 15+00.
3. SECTIONS VIEWED LOOKING UPSTREAM
4. ALIGNMENT OF PROPOSED SURFACE DRAINAGE SWALE TO BE DESIGNED TO MINIMIZE DISTURBANCE TO VEGETATION

PHOTOGRAPHY BY. Air Flight Service DATE:

RECTIFICATION BY Air Flight Service

DATE
2-1-88
DESIGN
SEB
DRAWN
CAM
CHECKED
KWW

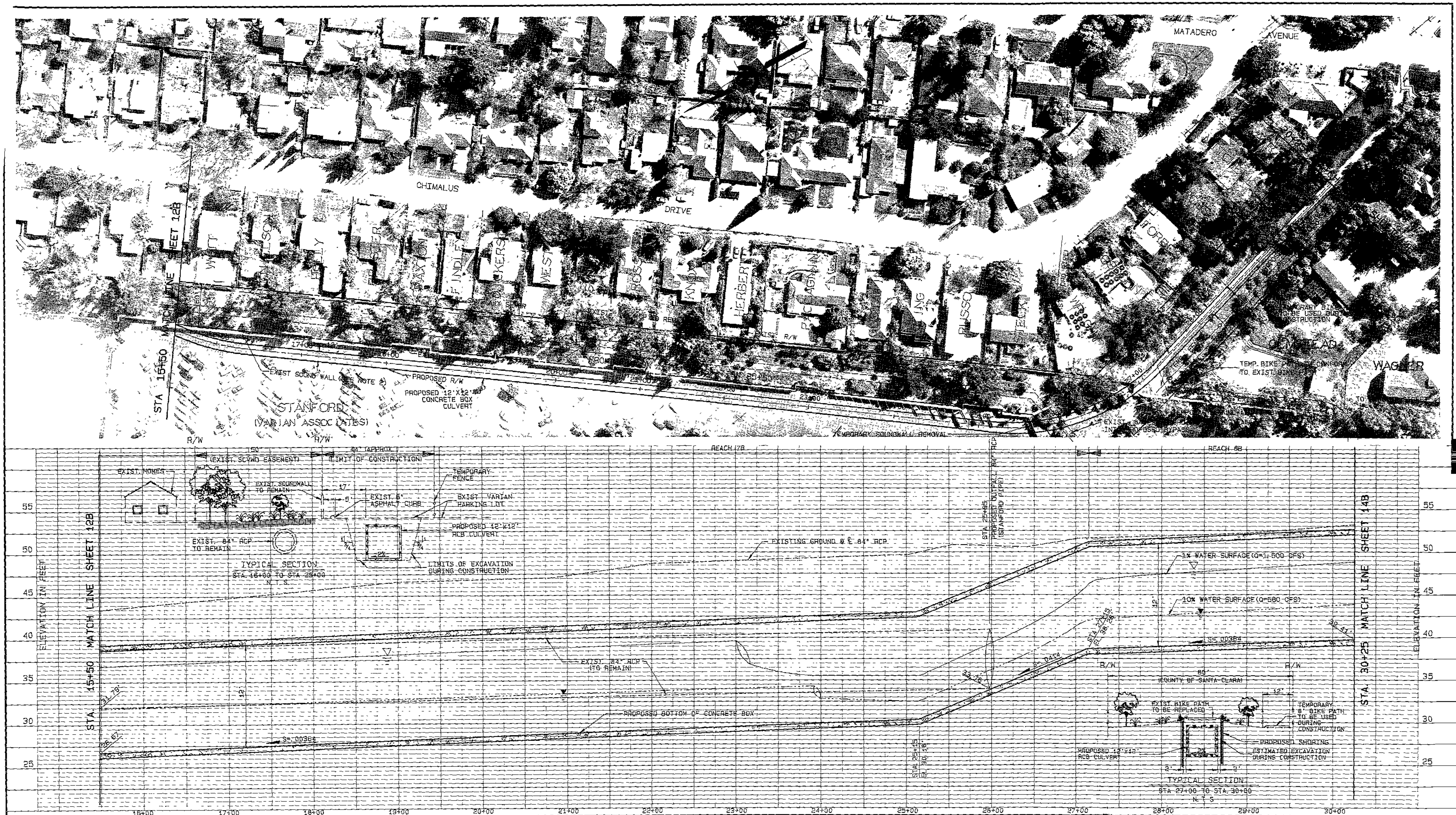
Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO 25093

ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO 20474

MATADERO CREEK
GENERAL PLAN
MATADERO BYPASS CHANNEL

SCALE
H: 1"=
V: 1"=
SHEET
12


MATADERO
AVENUE
CHIMALUS
DRIVE
OLMSTEAD
WAGNER
STA 15+50 MATCH LINE SHEET 12B
EXIST SOUND WALL (SEE NOTE 2)
PROPOSED R/W
PROPOSED 12'X12' RCB CONCRETE BOX CULVERT
STANFORD (VARIAN ASSOCIATES)
TEMP. BIKE PATH CONFORM TO EXIST.
TEMPORARY SOUNDWALL REMOVAL
R/W
150'
(EXIST. SCVWD EASEMENT)
34' APPROX.
(LIMIT OF CONSTRUCTION)
REACH 17B
REACH 8B
EXIST. HOMES
EXIST. SOUNDWALL TO REMAIN
EXIST. 6" ASPHALT CURB
TEMPORARY FENCE
EXIST. VARIAN PARKING LOT
PROPOSED 12'X12' RCB CULVERT
EXIST. 84" RCP TO REMAIN
LIMITS OF EXCAVATION DURING CONSTRUCTION
TYPICAL SECTION
STA. 16+00 TO STA 26+00
N.T.S.
EXISTING GROUND @ ℄ 84" RCP
STA. 25+95 PROPOSED OUTFALL 84" RCP (STANFORD PIPE)
1% WATER SURFACE (Q=1,500 CFS)
10% WATER SURFACE (Q=580 CFS)
EXIST. 84" RCP (TO REMAIN)
PROPOSED BOTTOM OF CONCRETE BOX
S=.00364
STA 25+15 EL 30.18
STA 27+13 EL 38.28
S=.0414
S=.00364
STA 30+25 MATCH LINE SHEET 14B
ELEVATION IN FEET
R/W
80'
(COUNTY OF SANTA CLARA)
EXIST. BIKE PATH TO BE REPLACED
TEMPORARY 8' BIKE PATH TO BE USED DURING CONSTRUCTION
PROPOSED SHORING
ESTIMATED EXCAVATION DURING CONSTRUCTION
PROPOSED 12'X12' RCB CULVERT
TYPICAL SECTION
STA 27+00 TO STA. 30+00
N.T.S.
55
50
45
40
35
30
25
16+00
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW		

REFERENCE INFORMATION AND NOTES:

1. BYPASS Q=1700 CFS DOWNSTREAM OF STA. 25+45 & Q=1500 CFS UPSTREAM.
2. PORTIONS OF EXISTING CONCRETE SOUND WALL TO BE TEMPORARILY REMOVED DURING CONSTRUCTION
3. ALL OUTFALLS INTO BYPASS CHANNEL SHALL INCLUDE FLAPGATES

Air Flight Service

RECTIFICATION BY: Air Flight Service

DATE	2-1-88
DESIGN	SEB
DRAWN	CAM
CHECKED	KWW

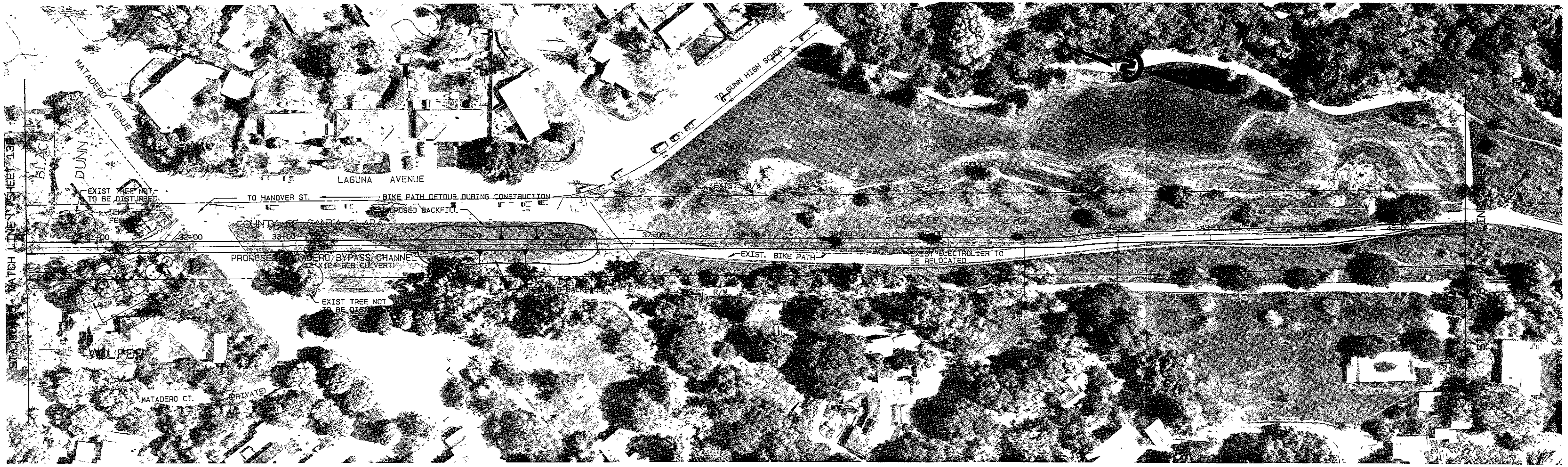
Santa Clara Valley Water District

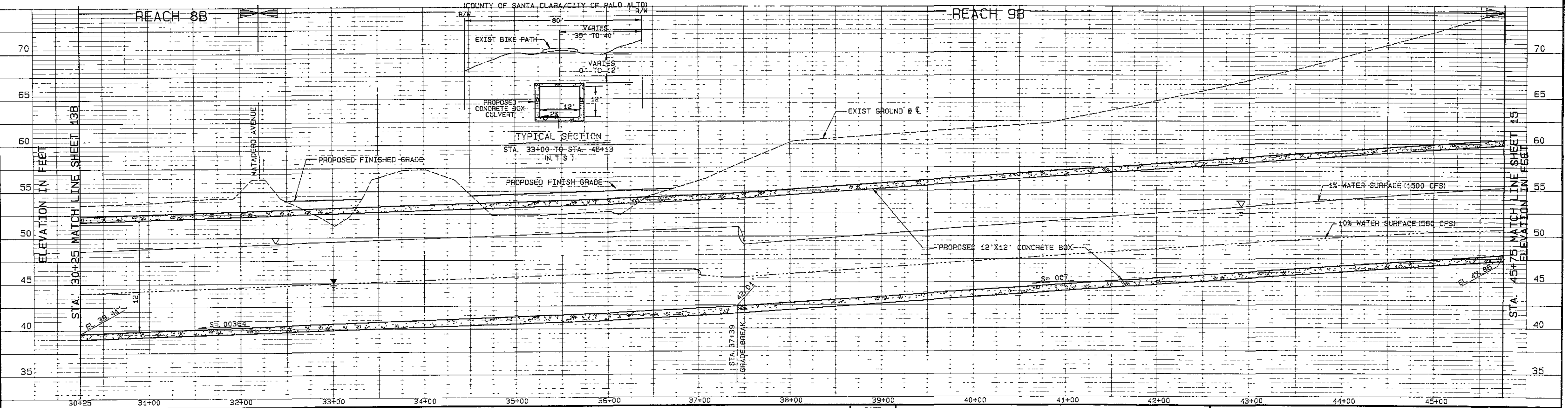
ENGINEERING CERTIFICATION
Keith W Whitman
PROJECT ENGINEER R.C.E. NO 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO 20474

MATADERO CREEK
GENERAL PLAN
MATADERO BYPASS CHANNEL

SCAL
VERT. 1"=
HOR. 1"=
SHE
13


MATADERO AVENUE
DUNN
LAGUNA AVENUE
TO GUNN HIGH SCHOOL
EXIST TREE NOT TO BE DISTURBED
TO HANOVER ST.
BIKE PATH DETOUR DURING CONSTRUCTION
PROPOSED BACKFILL
COUNTY OF SANTA CLARA
CITY OF PALO ALTO
PROPOSED MATADERO BYPASS CHANNEL (12'X12' RCB CULVERT)
EXIST. BIKE PATH
EXIST. ELECTROLIER TO BE RELOCATED
EXIST TREE NOT TO BE DIST
EXIST. R/W
MATADERO CT.
(PRIVATE)
32+00
33+00
37+00
38+00
39+00
45+00
STA. 30+25 MATCH LINE SHEET 13B



REV	DESCRIPTION	DATE	APPR.
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES:

1. BYPASS Q1%=1,500 CFS; n=.015
2. SECTIONS VIEWED LOOKING UPSTREAM.

PHOTOGRAPHY BY Air Flight Service

DATE

RECTIFICATION BY: Air Flight Service

DATE 2-1-88
DESIGN SEB
DRAWN CAM
CHECKED KWW

Santa Clara Valley Water District

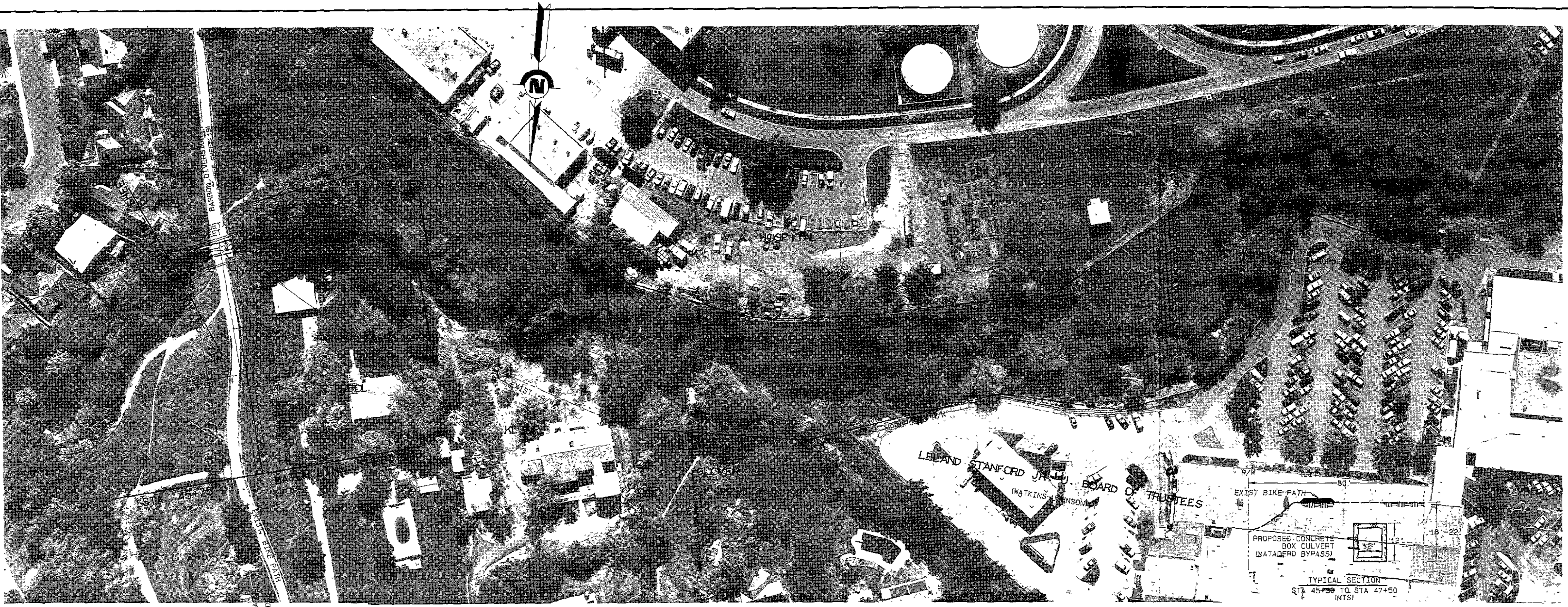
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

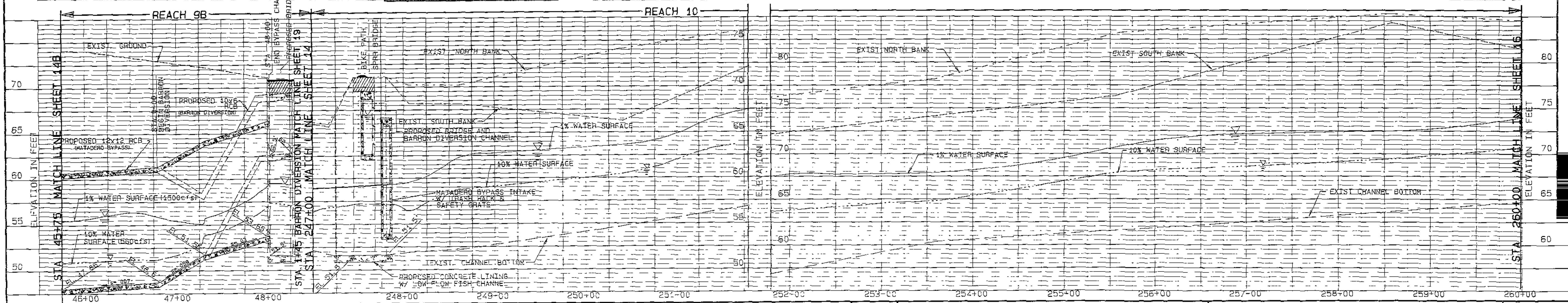
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
MATADERO BYPASS CHANNEL

SCALE
H: 1"=50'
V: 1"=5'

SHEET
14B




REACH 9B
REACH 10
STA 45+75 MATCH LINE SHEET 14B
ELEVATION IN FEET
EXIST. GROUND
STA 0+00 BEGIN BARRON DIVERSION
PROPOSED 10x6 RCB (BARRON DIVERSION)
PROPOSED 12x12 RCB (MATADERO BYPASS)
1% WATER SURFACE (1500cfs)
10% WATER SURFACE (560cfs)
EL 47.86
EL 48.6
S=.007
S=.059
EL 51.5
EL 53.65
STA 48+00 END BYPASS CHANNEL
PROPOSED BRIDGE
STA 1+45 BARRON DIVERSION MATCH LINE SHEET 19
STA 247+00 MATCH LINE SHEET 14
BIKE PATH
SPRR BRIDGE
EXIST. NORTH BANK
EXIST. SOUTH BANK
PROPOSED BRIDGE AND BARRON DIVERSION CHANNEL
1% WATER SURFACE
10% WATER SURFACE
MATADERO BYPASS INTAKE W/ TRASH RACK & SAFETY GRATE
EL 51.5
EXIST. CHANNEL BOTTOM
PROPOSED CONCRETE LINING W/ LOW FLOW FISH CHANNEL
EXIST NORTH BANK
EXIST SOUTH BANK
1% WATER SURFACE
10% WATER SURFACE
EXIST CHANNEL BOTTOM
STA 260+00 MATCH LINE SHEET 16
50
55
60
65
70
75
80
46+00
47+00
48+00
248+00
249+00
250+00
251+00
252+00
253+00
254+00
255+00
256+00
257+00
258+00
259+00
260+00

REV	DESCRIPTION	DATE	APPR

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES

1 WATER SURFACE BASED ON Q1%=2 200 CFS. N=.040 UPSTREAM STA 248+00 & Q 10%=960 CFS
2. Q1% INFLOW TO BYPASS CHANNEL= 900 CFS. Q10%=400 CFS
3 Q1% OUTFLOW FROM DIVERSION CHANNEL= 600 CFS. Q10%= 160 CFS
4 Q1% DOWNSTREAM STA 247+25= 1,300 CFS. Q10%= 560 CFS
5 SECTIONS VIEWED LOOKING UPSTREAM

PHOTOGRAPHY BY AIR FLIGHT SERVICE

DATE 2-27-86

RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN SEB
DRAWN KEM
CHECKED KWW

Santa Clara Valley Water District

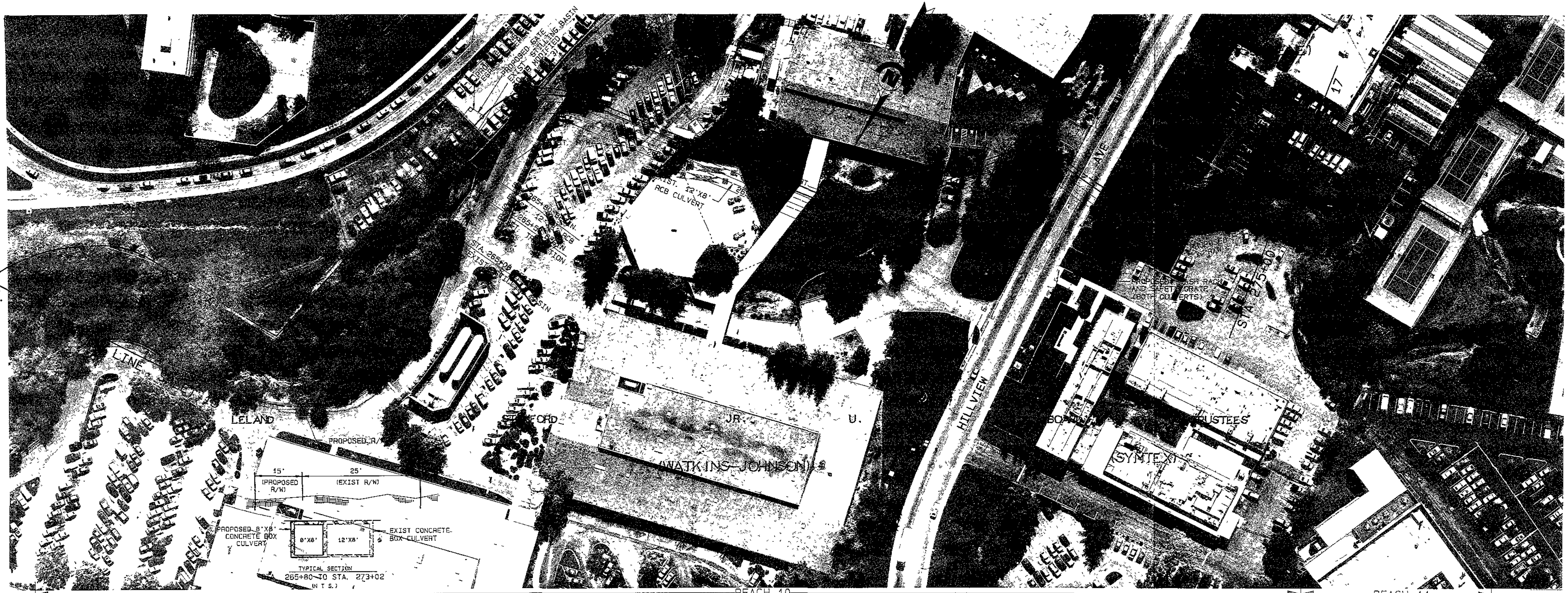
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35883
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

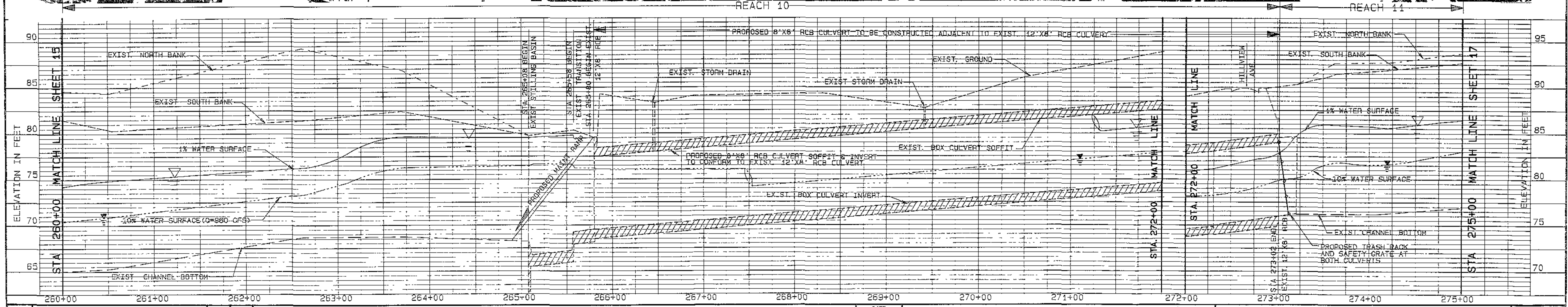
ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H 1"=50'
V 1"=5'

SHEET
15





REV	DESCRIPTION	DATE	APPR

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES
1. WATER SURFACE BASED ON Q1%=2200CFS, N=.05 DOWNSTREAM OF STATION 265+00, & Q10%=960 CFS
2. SECTIONS VIEWED LOOKING UPSTREAM
3. OUTLET OF PROPOSED 8'X8' RCB CULVERT TO CONFORM WITH EXISTING CULVERT OUTLET. STILLING BASIN TO BE WIDENED TO ACCOMODATE PROPOSED CULVERT.

PHOTOGRAPHY BY AIR FLIGHT SERVICE DATE 2-27-86 RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN SEB
DRAWN SEB
CHECKED KWW

Santa Clara Valley Water District

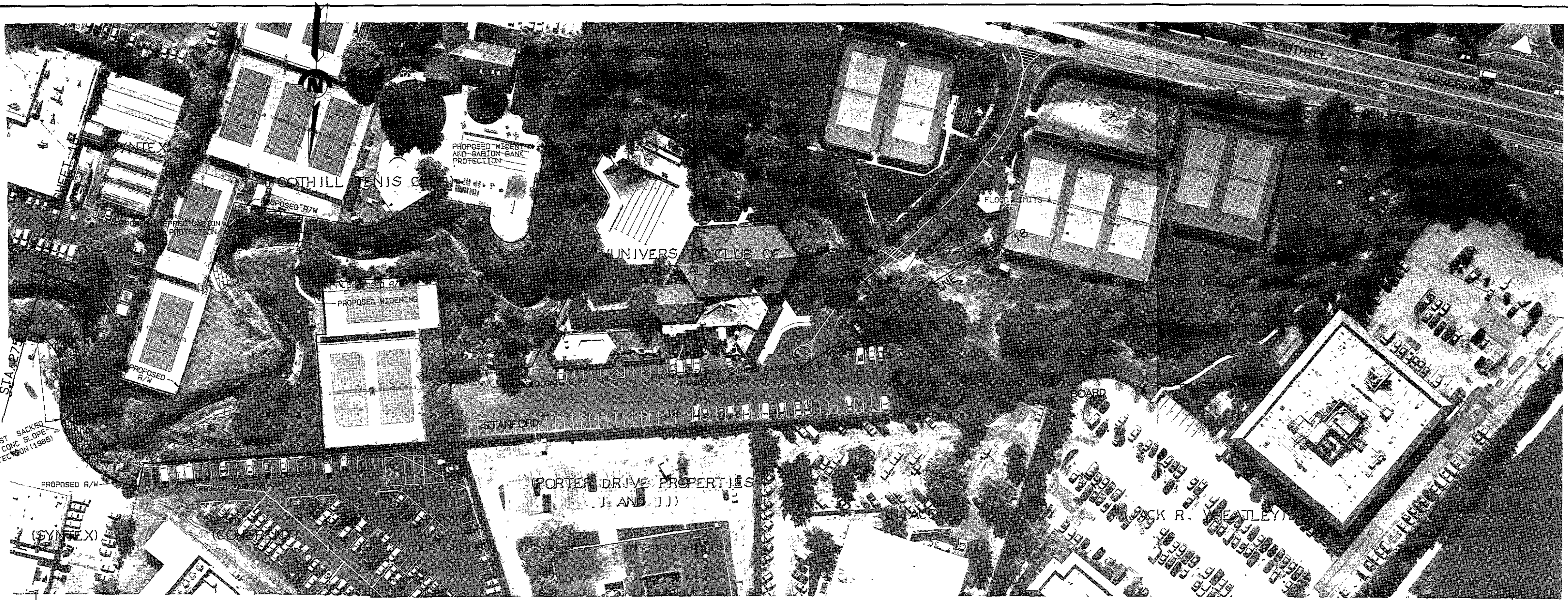
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

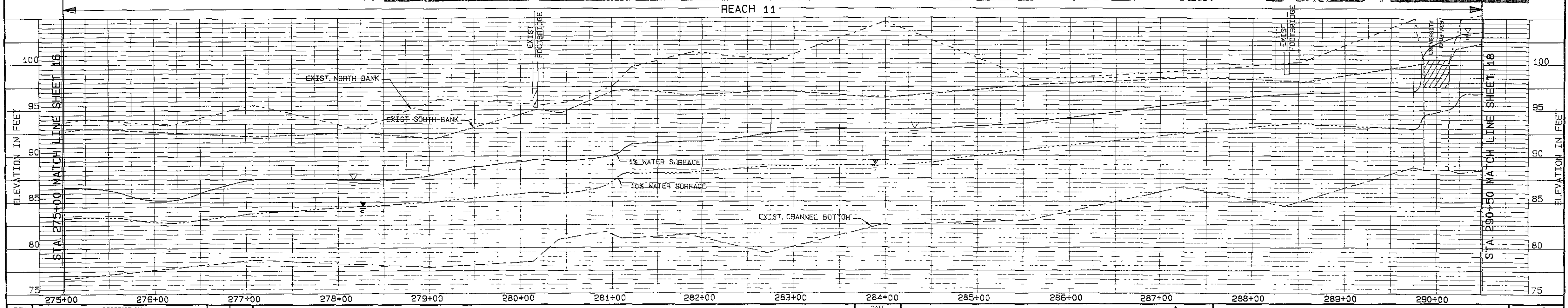
ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H 1"=50'
V 1"=5'

SHEET
16





REV	DESCRIPTION	DATE	APPR

REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REFERENCE INFORMATION AND NOTES

1 1% WATER SURFACE BASED ON Q=2200 CFS; n=.03 to .04 & 10% WATER SURFACE BASED ON Q=960 CFS.

PHOTOGRAPHY BY AIR FLIGHT SERVICE DATE 2-27-86 RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN SEB
DRAWN CAM
CHECKED KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35880
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

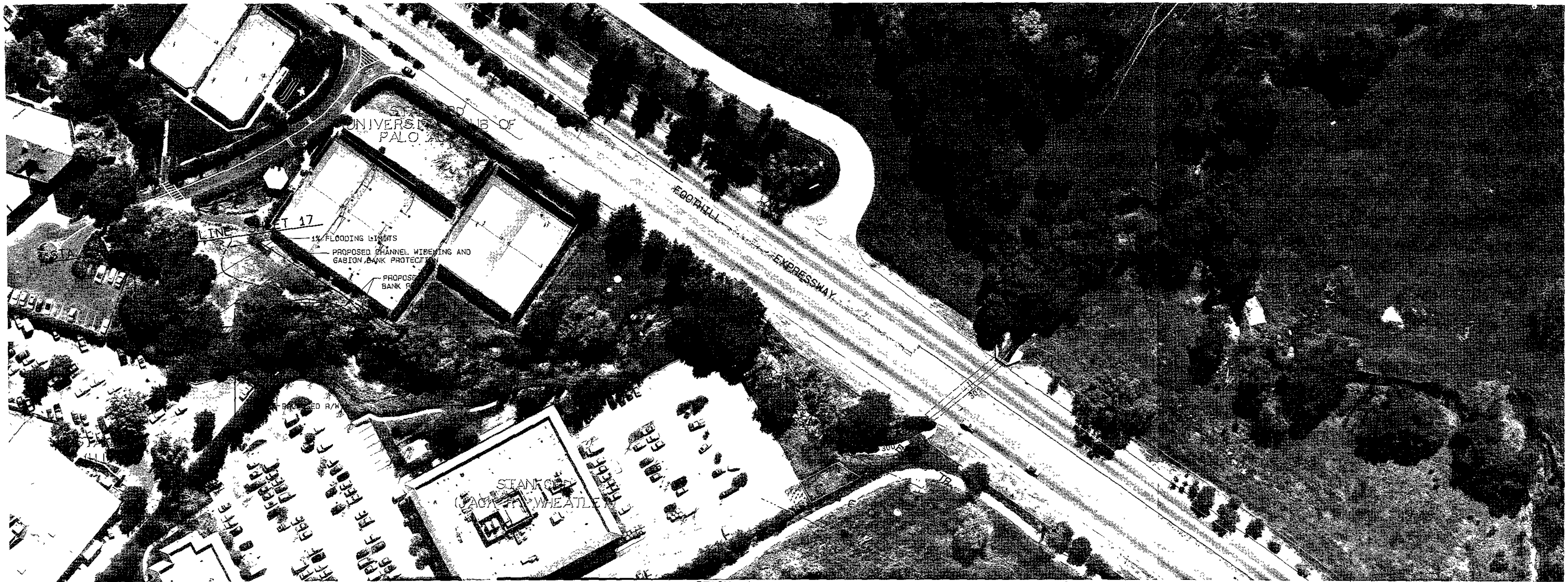
MATADERO CREEK

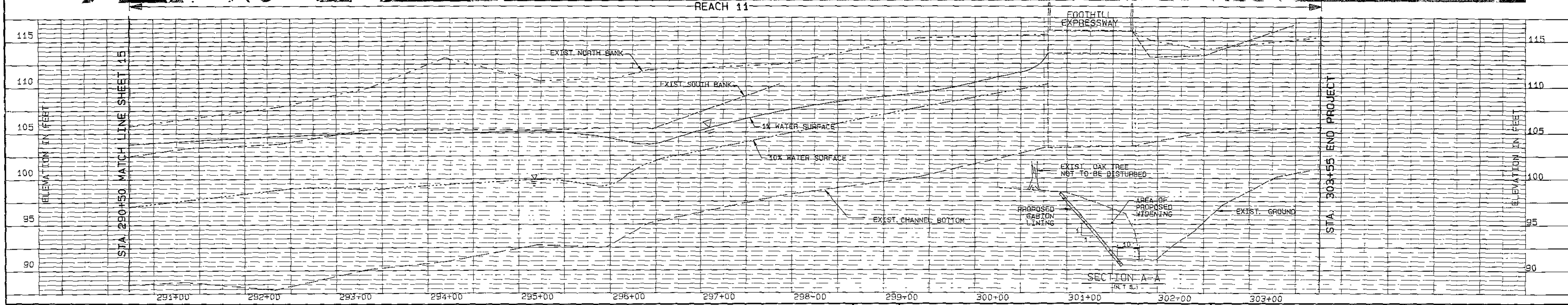
GENERAL PLAN

FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H: 1"=50'
V: 1"=5'

SHEET
17


STANFORD UNIVERSITY CLUB OF PALO ALTO
FOOTHILL EXPRESSWAY
MATCH LINE SHEET 17
STA
1% FLOODING LIMITS
PROPOSED CHANNEL WIDENING AND GABION BANK PROTECTION
PROPOSED BANK P
PROPOSED R/W
STANFORD (JACK H. WHEATLEY)
30
300
JB



REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1. 1% WATER SURFACE BASED ON Q1%=2,200 CFS, N=.040 & 10% WATER SURFACE BASED ON Q=960 CFS

PHOTOGRAPHY BY AIR FLIGHT SERVICE DATE 2-27-86 RECTIFICATION BY AIR FLIGHT SERVICE

DATE 2-1-88
DESIGN SEB
DRAWN L HILL
CHECKED KWW

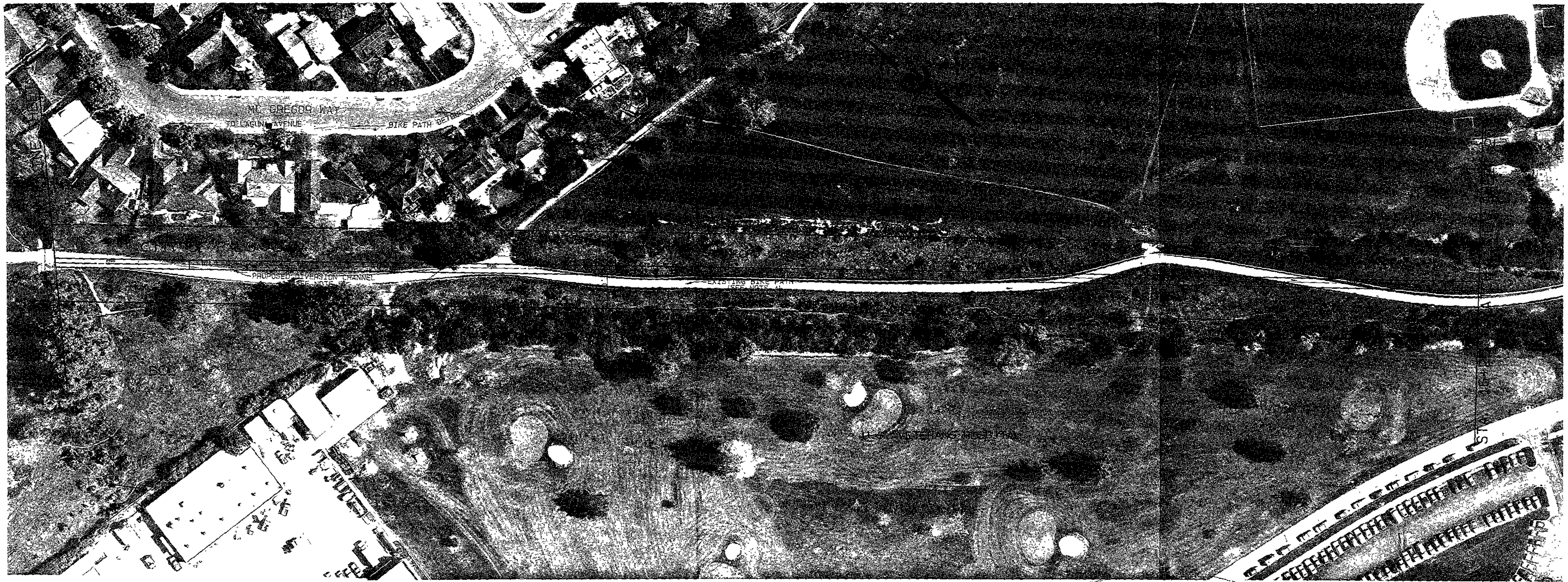
Santa Clara Valley Water District

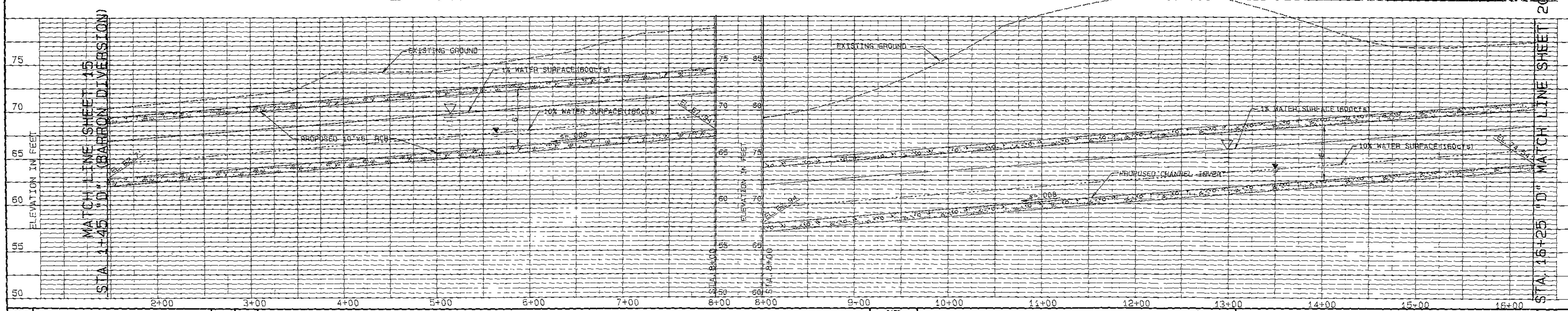
ENGINEERING CERTIFICATION
Keith W Whitman
PROJECT ENGINEER R.C.E. NO. 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
Stan Wolf
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO. 20474

MATADERO CREEK
GENERAL PLAN
FLOOD BASIN TO FOOTHILL EXPWY

SCALE
H. 1"=50'
V. 1"=5'
SHEET
18





REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 2 3		

REFERENCE INFORMATION AND NOTES

1. WATER SURFACE BASED ON Q1%= 600cfs, n=.015 IN BARRON DIVERSION CHANNEL
2. Q1%= 1,300cfs IN MATADERO CREEK DOWNSTREAM OF MATADERO BYPASS CHANNEL
3. Q1%= 900cfs IN MATADERO BYPASS CHANNEL BEFORE CONFLUENCE WITH BARRON DIVERSION.
4. BIKE PATH TRAFFIC TO BE DIVERTED DURING CONSTRUCTION SUBJECT TO APPROVAL BY CITY OF PALO ALTO AND SCHOOL DISTRICT
5. BIKE PATH TO BE RESTORED UPON COMPLETION OF DIVERSION CHANNEL. ADJACENT VEGETATION TO BE REPLANTED AS NECESSARY

2-27-86

RECTIFICATION BY AIR FLIGHT SERVICE

DATE
2-1-88
DESIGN
BUKSH
DRAWN
TUCKER
CHECKED
WHITMAN

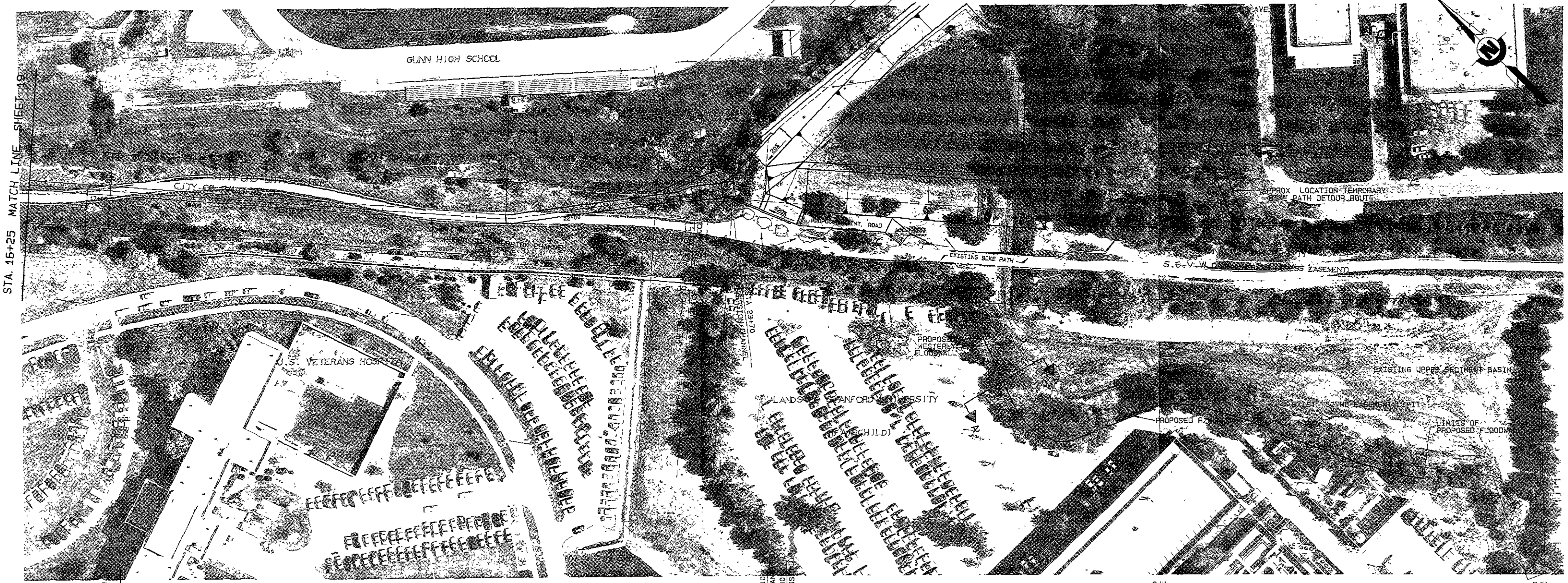
Santa Clara Valley Water District

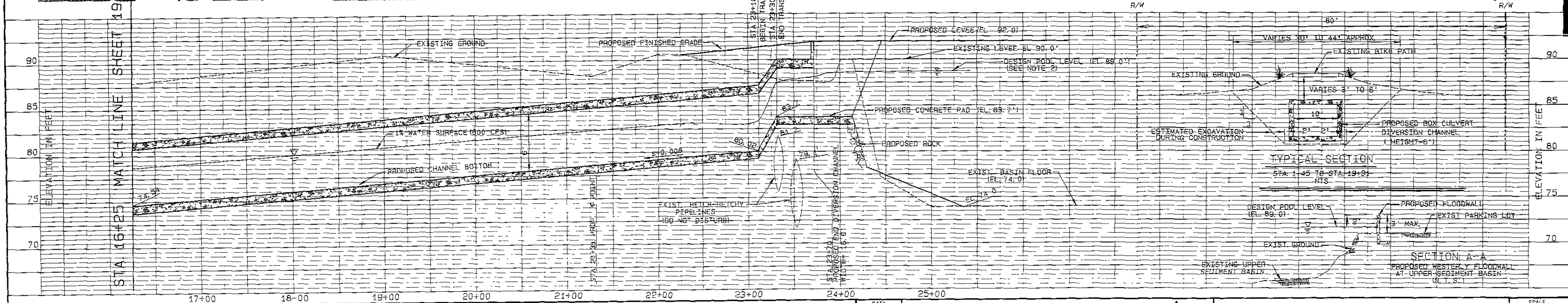
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO 25093

ENGINEERING APPROVAL
Stan Wolfe
HEAD PROJECT DEVELOPMENT BRANCH R.C.E. NO 20474

MATADERO CREEK
GENERAL PLAN
BARRON DIVERSION CHANNEL

H:
V:
S
1


STA. 16+25 MATCH LINE SHEET 19
GUNN HIGH SCHOOL
STANFORD UNIVERSITY
CITY OF PALO ALTO
17+00
18+00
22+00
PROPOSED DIVERSION CHANNEL
STA 23+70
DIVERSION CHANNEL
20%
PROPOSED MAINT. ROAD
EXISTING BIKE PATH
APPROX LOCATION TEMPORARY BIKE PATH DETOUR ROUTE
S.C.V.W.D. EASEMENT
U.S. VETERANS HOSPITAL
LANDS OF STANFORD UNIVERSITY (FAIRCHILD)
PROPOSED WESTERLY FLOODWALL
A
A
EXISTING UPPER SEDIMENT BASIN
EXIST. SCVWD EASEMENT LIMIT
PROPOSED R/W
LIMITS OF PROPOSED FLOODWALL
N


STA 16+25 MATCH LINE SHEET 19
ELEVATION IN FEET
90
85
80
75
70
EXISTING GROUND
PROPOSED FINISHED GRADE
1% WATER SURFACE (800 CFS)
PROPOSED CHANNEL BOTTOM
74.54
6'
S=0.008
STA 21+30 PROP. ℄ POINT
STA 23+10 BEGIN TRANS
STA 23+30 END TRANS
PROPOSED LEVEE (EL. 92.0)
EXISTING LEVEE EL 90.0'
DESIGN POOL LEVEL (EL 89.0') (SEE NOTE 2)
83.7
81.7
80.02
79.1
PROPOSED CONCRETE PAD (EL. 83.7')
PROPOSED ROCK
EXIST. HETCH-HETCHY PIPELINES (DO NOT DISTURB)
STA 23+70 PROPOSED END DIVERSION CHANNEL WIDTH=16.0'
EXIST. BASIN FLOOR (EL. 74.0)
EL 74.0
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
R/W
R/W
80'
VARIES 30' TO 44' APPROX.
EXISTING BIKE PATH
EXISTING GROUND
VARIES 3' TO 6'
10'
2'
2'
1
1
ESTIMATED EXCAVATION DURING CONSTRUCTION
PROPOSED BOX CULVERT DIVERSION CHANNEL (HEIGHT=6')
TYPICAL SECTION
STA. 1+45 TO STA. 19+91
NTS
DESIGN POOL LEVEL (EL. 89.0)
2'
3' MAX.
PROPOSED FLOODWALL
EXIST PARKING LOT
EXIST. GROUND
EXISTING UPPER SEDIMENT BASIN
SECTION A-A
PROPOSED WESTERLY FLOODWALL AT UPPER SEDIMENT BASIN
(N.T.S.)

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1 SECTIONS VIEWED LOOKING UPSTREAM.
2. DESIGN POOL LEVEL IN BASIN BASED ON Q1%=760 CFS TOTAL, WITH 600 CFS INTO DIVERSION CHANNEL AND 160 CFS INTO BARRON CREEK.
3 *BIKE PATH TO BE RESTORED UPON COMPLETION OF DIVERSION CHANNEL. ADJACENT VEGETATION TO BE REPLANTED*
4 SEE ENGINEERS REPORT APPENDIX J FOR HYDROLIC DESIGN CRITERIA.

PHOTOGRAPHY BY AIR FLIGHT SERVICE   DATE: 2-27-86   RECTIFICATION BY AIR FLIGHT SERVICE

DATE
2-1-88
DESIGN
SEB
DRAWN
TUCKER
CHECKED
WHITMAN

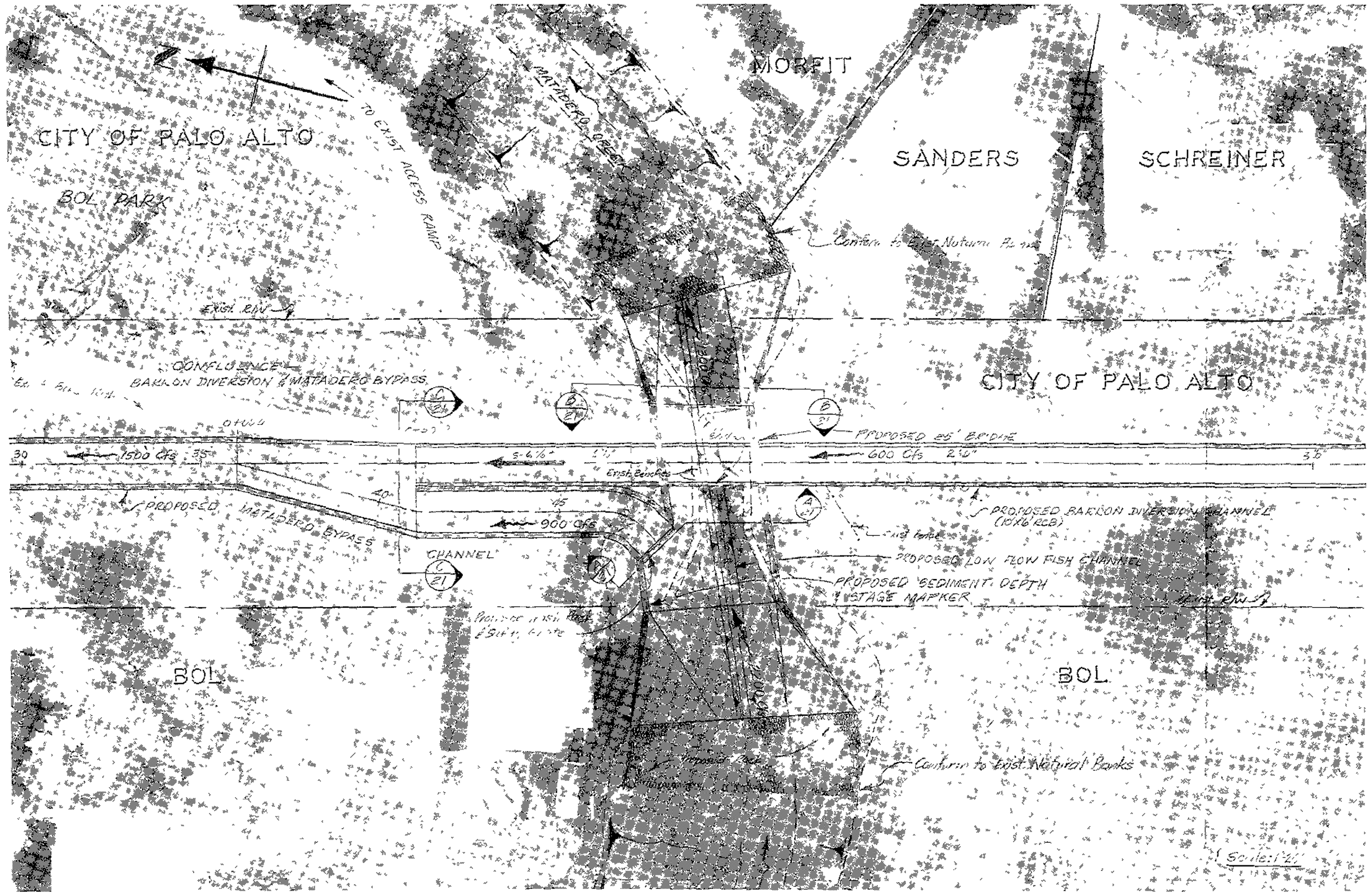
Santa Clara Valley Water District

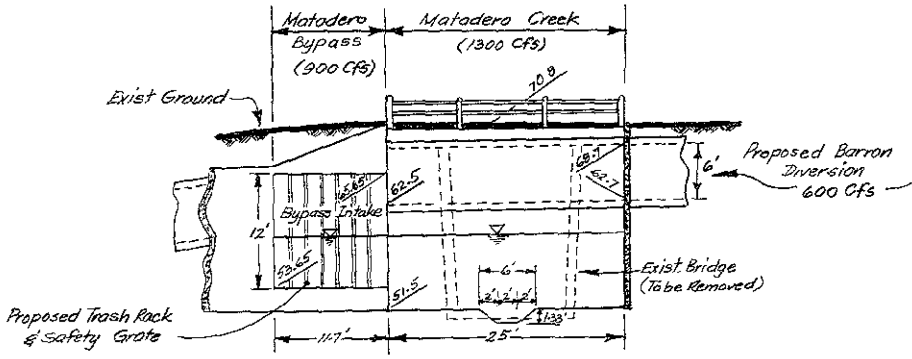
ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO 35863
DIVISION ENGINEER R.C.E. NO. 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO 20474

MATADERO CREEK
GENERAL PLAN
BARRON DIVERSION CHANNEL

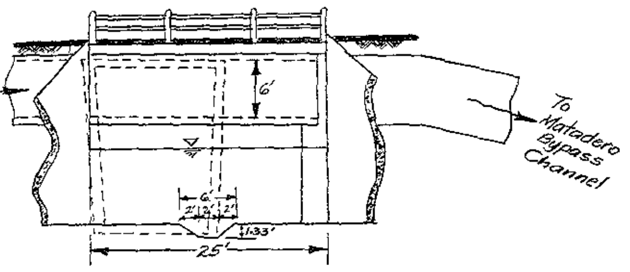
SCALE
H: 1"=50'
V: 1"=5'
SHEET
20


N
CITY OF PALO ALTO
BOL PARK
TO EXIST ACCESS RAMP
MATADERO CREEK
MOFFIT
SANDERS
SCHREINER
Conform to Exist Natural Banks
Exist. R/W
CONFLUENCE BARRON DIVERSION & MATADERO BYPASS
CITY OF PALO ALTO
C/21
B/21
B/21
PROPOSED 25' BRIDGE
1500 Cfs
900 Cfs
600 Cfs
30
35
40
45
S=.6%
Exist. Benches
PROPOSED MATADERO BYPASS CHANNEL
C/21
A/21
PROPOSED BARRON DIVERSION CHANNEL (10'x6' RCB)
Exist fence
PROPOSED LOW FLOW FISH CHANNEL
PROPOSED SEDIMENT DEPTH & STAGE MARKER
Exist. R/W
Proposed Trash Rack & Safety Grate
BOL
BOL
Proposed Rock
Conform to Exist Natural Banks
Scale: 1"=40'


Matadero Bypass (900 Cfs)
Matadero Creek (1300 Cfs)
Exist Ground
70.8
Proposed Barron Diversion 600 Cfs
6'
63.5
62.5
63.1
62.7
12'
Bypass Intake
53.65
51.5
6'
1.33'
Exist Bridge (To be Removed)
Proposed Trash Rack & Safety Grate
11.7'
25'

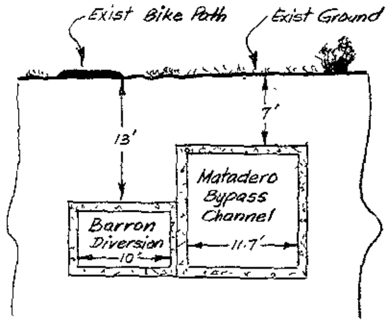
A/21 SECTION A-A

(Scale:1"=10')



B/21 SECTION B-B

(Scale:1"=10')



C/21 SECTION C-C

(Scale: 1"=10')

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3 3 INCHES ON ORIGINAL PLAN		

REFERENCE INFORMATION AND NOTES

1 All Design Flow Rates Indicated Are For 1% Event

DATE 2-1-88
DESIGN SEB
DRAWN SEB
CHECKED KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Randy Talley

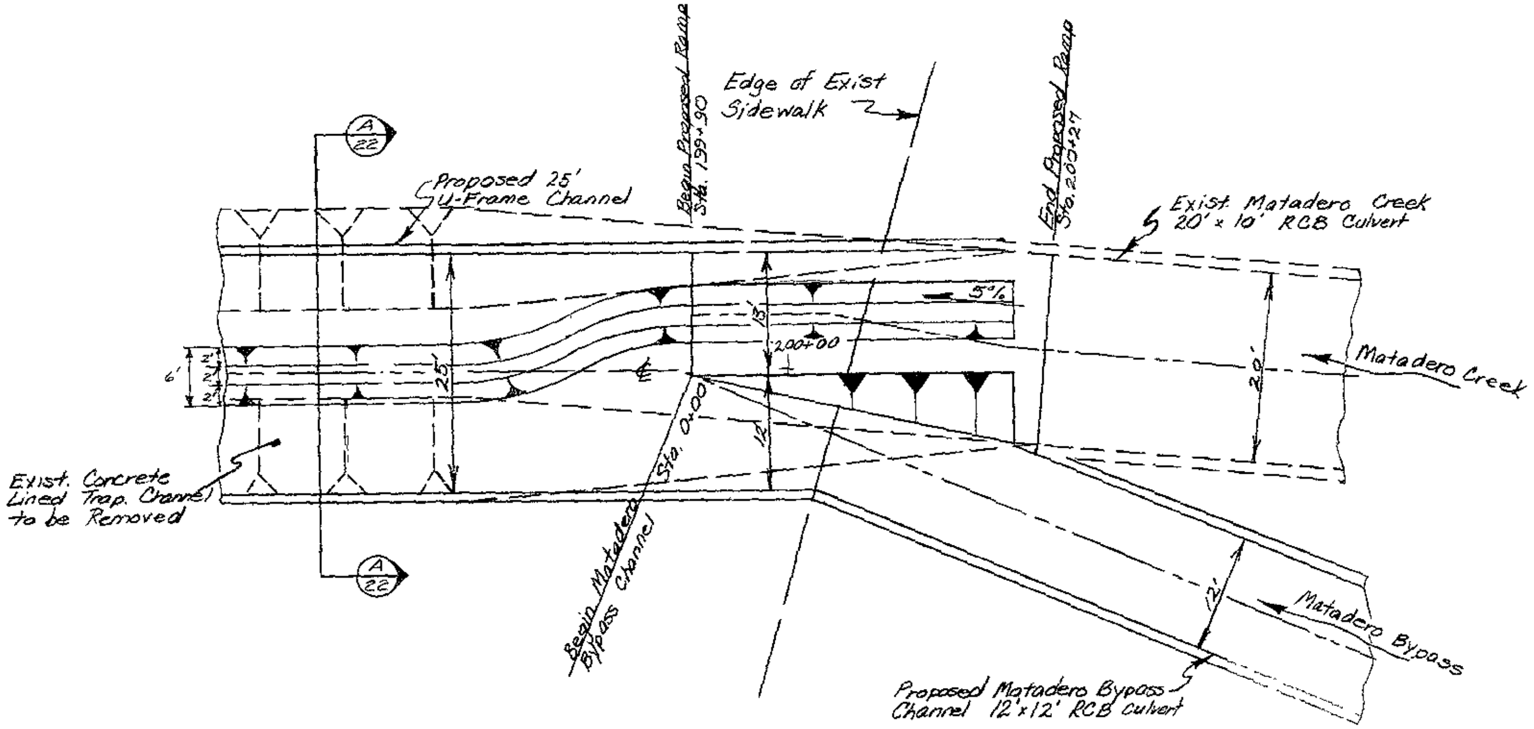
ENGINEERING APPROVAL
Stan Wolfe

MATADERO CREEK

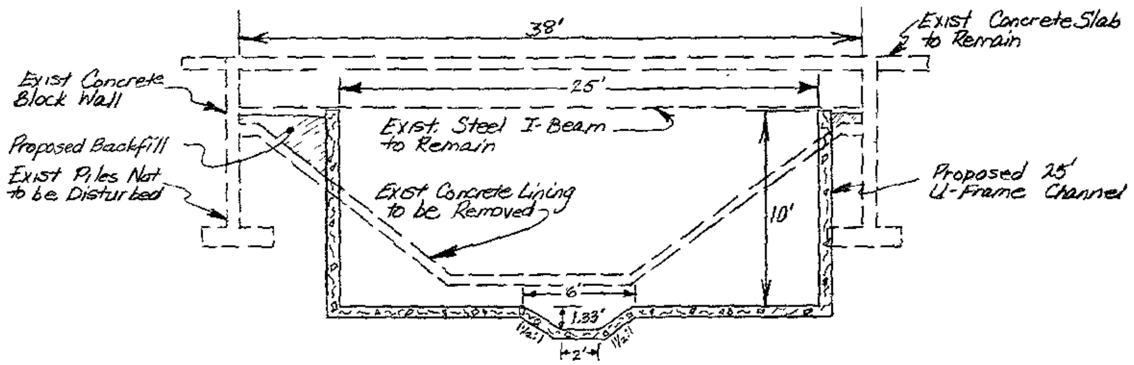
MATADERO BYPASS & BARRON DIVERSION

CONFLUENCE DETAIL

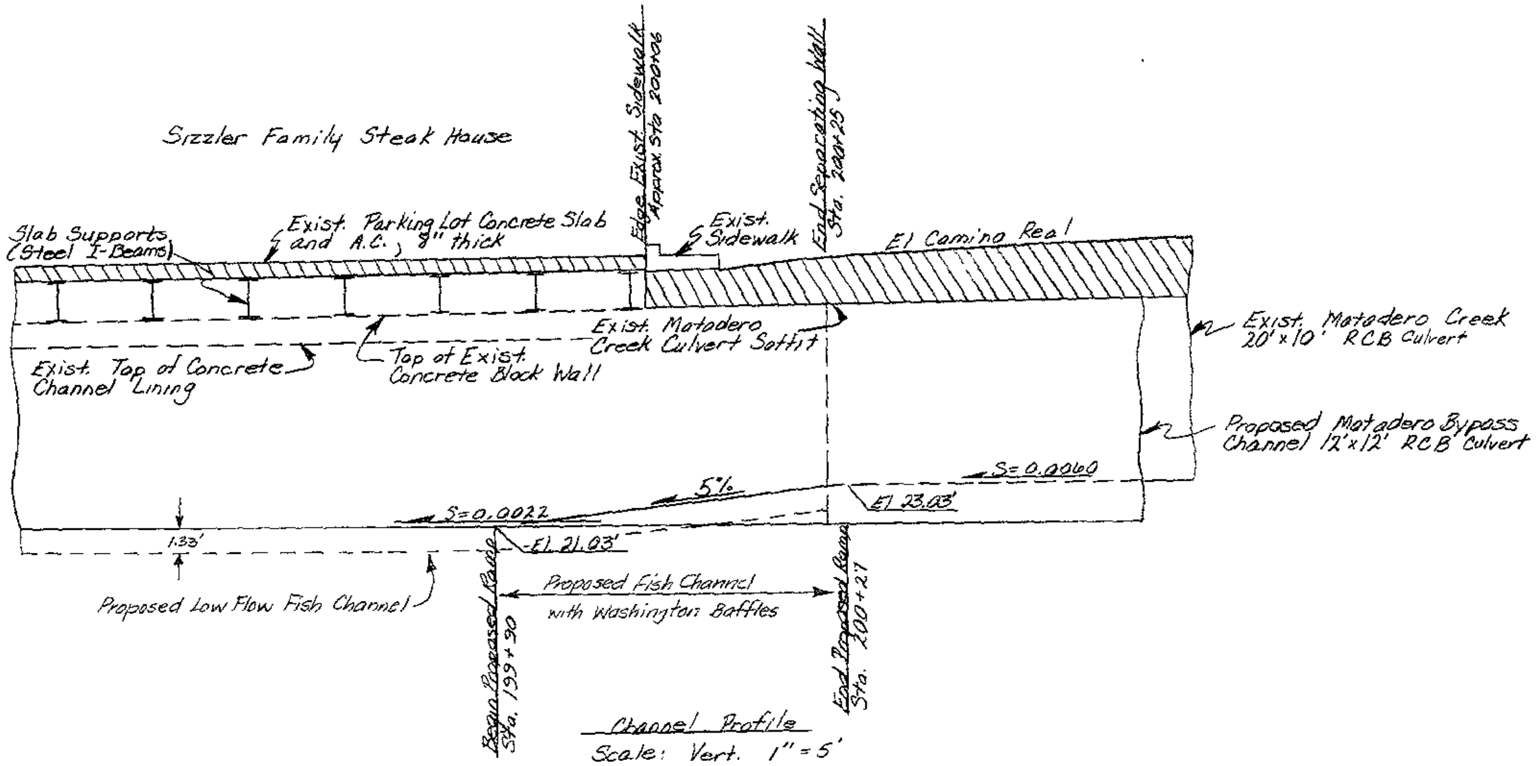
SCALE As Shown
SHEET 21


A 22
Proposed 25' U-Frame Channel
Begin Proposed Ramp Sta. 199+90
Edge of Exist Sidewalk
End Proposed Ramp Sta. 200+27
Exist. Matadero Creek 20' x 10' RCB Culvert
5%
200+00
25'
20'
13'
12'
6'
2'
Matadero Creek
Exist. Concrete Lined Trap. Channel to be Removed
Sta. 0+00
Begin Matadero Bypass Channel
12'
Matadero Bypass
Proposed Matadero Bypass Channel 12'x12' RCB culvert
A 22

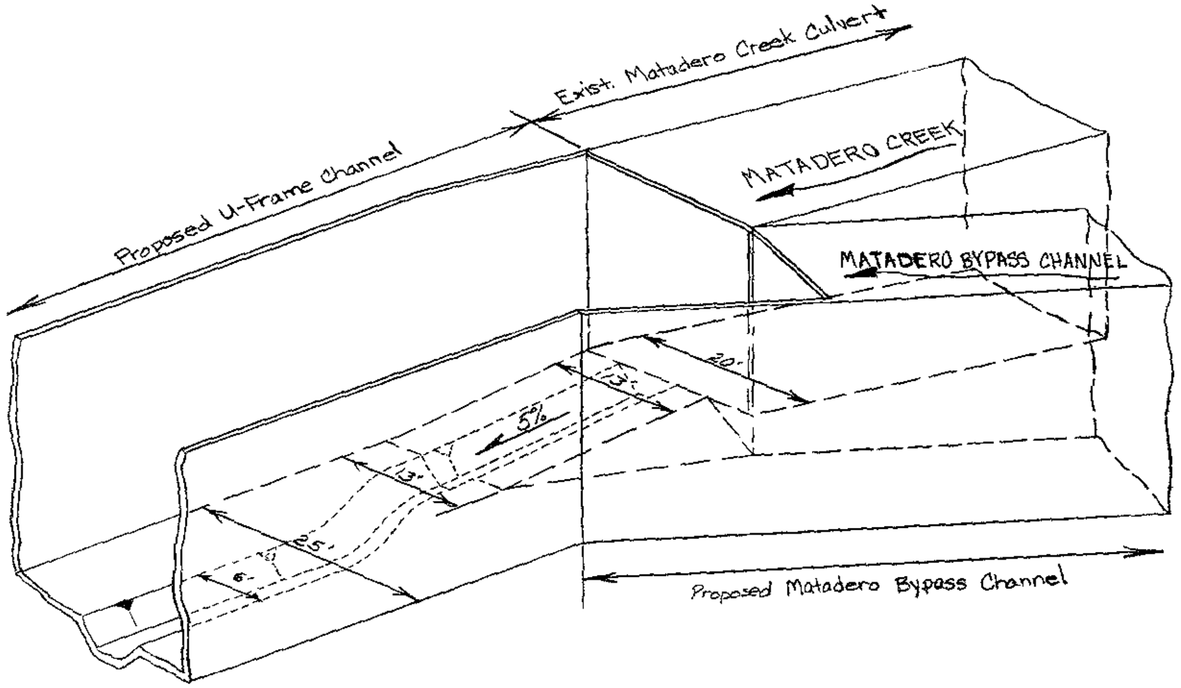
1/22 Plan View
Scale: 1" = 10'


38'
Exist Concrete Slab to Remain
Exist Concrete Block Wall
25'
Exist. Steel I-Beam to Remain
Proposed Backfill
Exist Piles Not to be Disturbed
Exist Concrete Lining to be Removed
10'
Proposed 25' U-Frame Channel
6'
1.33'
1½:1
2'

A/22 Section
Scale: 1" = 5'


Sizzler Family Steak House
Edge Exist Sidewalk Approx Sta 200+06
End Separating Wall Sta. 200+25
Slab Supports (Steel I-Beams)
Exist. Parking Lot Concrete Slab and A.C., 8" thick
Exist. Sidewalk
El Camino Real
Exist. Matadero Creek Culvert Soffit
Exist. Matadero Creek 20'x10' RCB Culvert
Exist. Top of Concrete Channel Lining
Top of Exist. Concrete Block Wall
Proposed Matadero Bypass Channel 12'x12' RCB Culvert
S=0.0060
5%
El 23.03'
S=0.0022
El 21.03'
1.33'
Proposed Low Flow Fish Channel
Proposed Fish Channel with Washington Baffles
Begin Proposed Ramp Sta. 199+90
End Proposed Ramp Sta. 200+27

Channel Profile
Scale: Vert. 1" = 5'
Hor. 1" = 10'



Isometric Section
N.T.S.

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 0 1 2 3		

REFERENCE INFORMATION AND NOTES

See Sheet 11 for General Plan of this Area

DATE 2-1-88
DESIGN SEB
DRAWN KEM
CHECKED KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Randy Talley

ENGINEERING APPROVAL

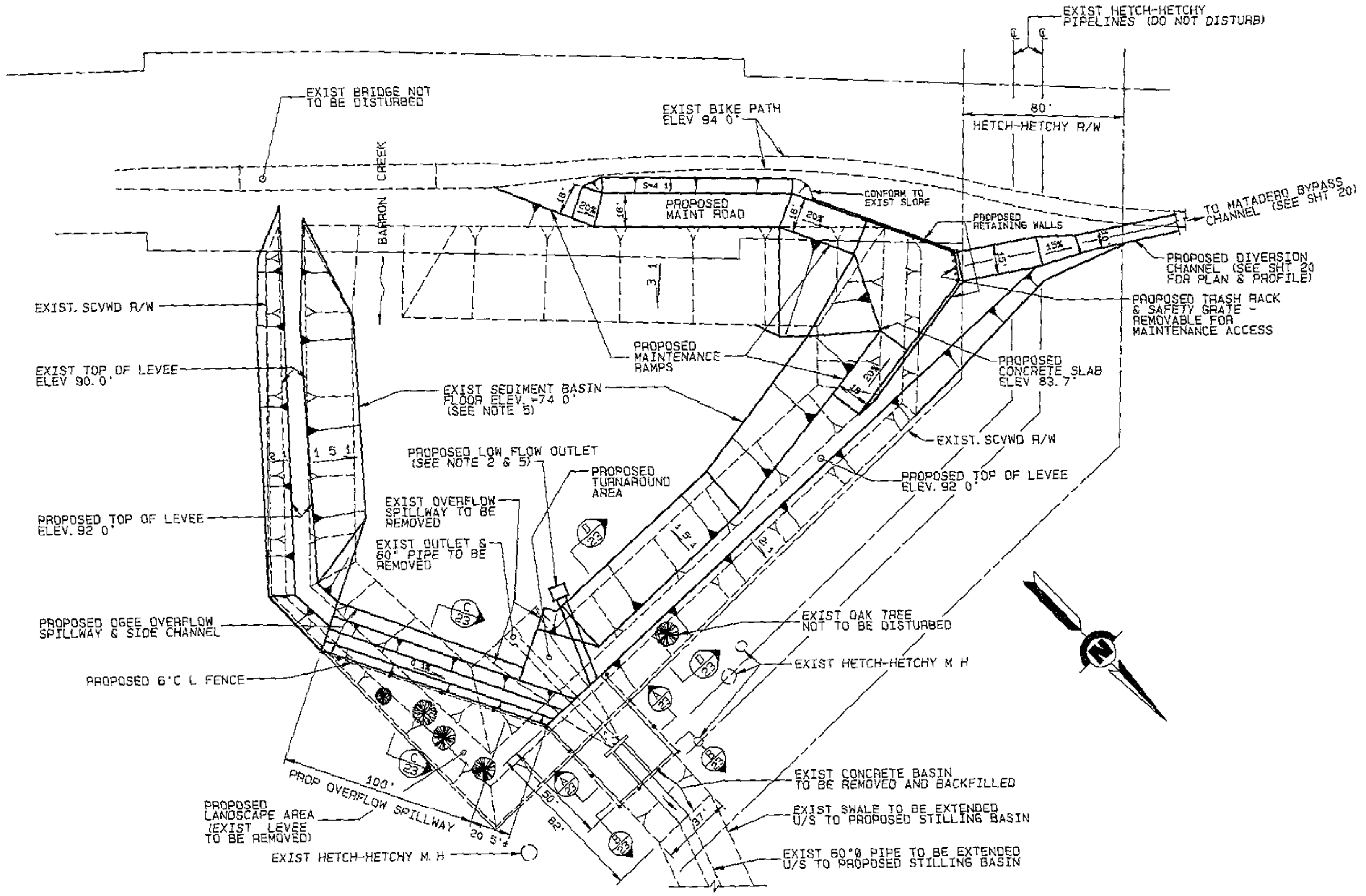
MATADERO CREEK

MATADERO BYPASS & MATADERO CREEK

CONFLUENCE DETAIL

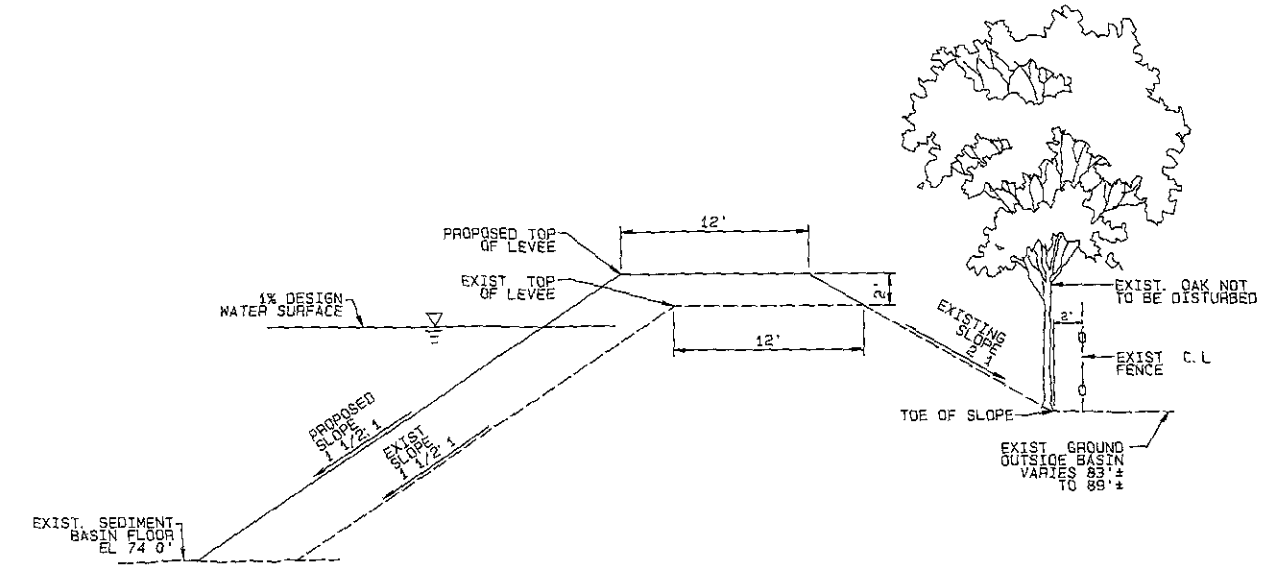
SCALE As Shown

SHEET 22


EXIST HETCH-HETCHY PIPELINES (DO NOT DISTURB)
80'
HETCH-HETCHY R/W
EXIST BRIDGE NOT TO BE DISTURBED
EXIST BIKE PATH ELEV 94 0'
BARRON CREEK
PROPOSED MAINT ROAD
S=4 1
CONFORM TO EXIST SLOPE
PROPOSED RETAINING WALLS
TO MATADERO BYPASS CHANNEL (SEE SHT 20)
PROPOSED DIVERSION CHANNEL (SEE SHT 20 FOR PLAN & PROFILE)
PROPOSED TRASH RACK & SAFETY GRATE - REMOVABLE FOR MAINTENANCE ACCESS
EXIST. SCVWD R/W
EXIST TOP OF LEVEE ELEV 90.0'
PROPOSED MAINTENANCE RAMPS
EXIST SEDIMENT BASIN FLOOR ELEV. =74 0' (SEE NOTE 5)
PROPOSED CONCRETE SLAB ELEV 83.7'
PROPOSED LOW FLOW OUTLET (SEE NOTE 2 & 5)
PROPOSED TURNAROUND AREA
EXIST. SCVWD R/W
PROPOSED TOP OF LEVEE ELEV. 92 0'
EXIST OVERFLOW SPILLWAY TO BE REMOVED
EXIST OUTLET & 60" PIPE TO BE REMOVED
PROPOSED OGEE OVERFLOW SPILLWAY & SIDE CHANNEL
EXIST OAK TREE NOT TO BE DISTURBED
PROPOSED 6'C L FENCE
EXIST HETCH-HETCHY M H
100'
PROP OVERFLOW SPILLWAY
EXIST CONCRETE BASIN TO BE REMOVED AND BACKFILLED
PROPOSED LANDSCAPE AREA (EXIST LEVEE TO BE REMOVED)
20 5'±
EXIST SWALE TO BE EXTENDED U/S TO PROPOSED STILLING BASIN
EXIST HETCH-HETCHY M. H
EXIST 60"Ø PIPE TO BE EXTENDED U/S TO PROPOSED STILLING BASIN
N

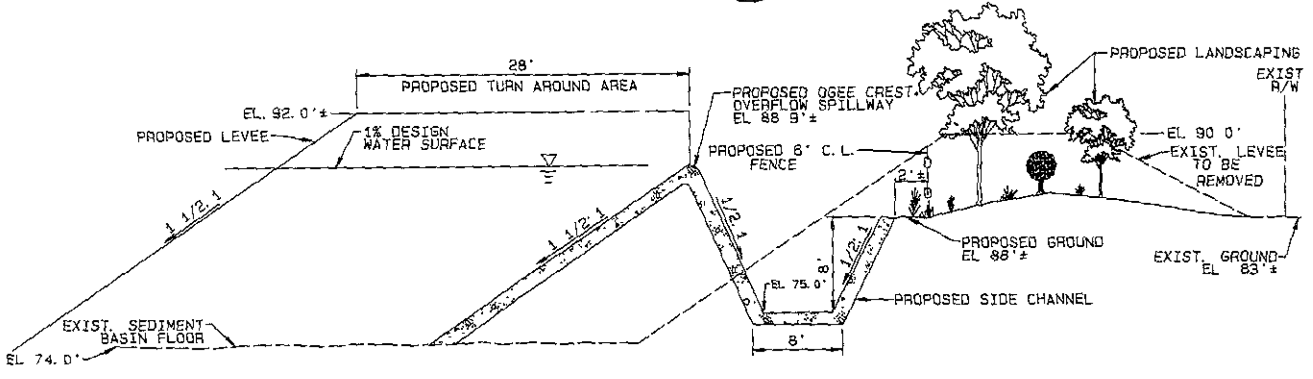
DETAIL 1/23 SEDIMENT BASIN

SCALE · 1"=40'



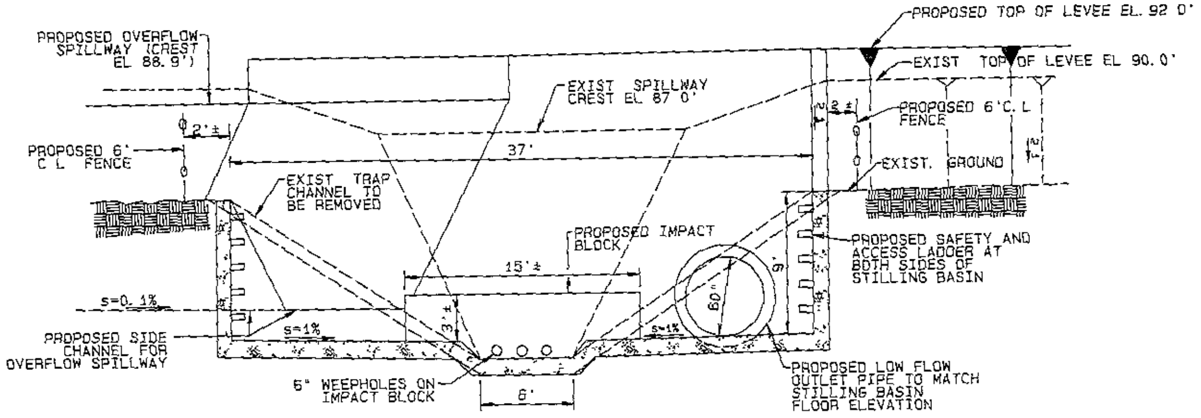
SECTION D/23

N T S.



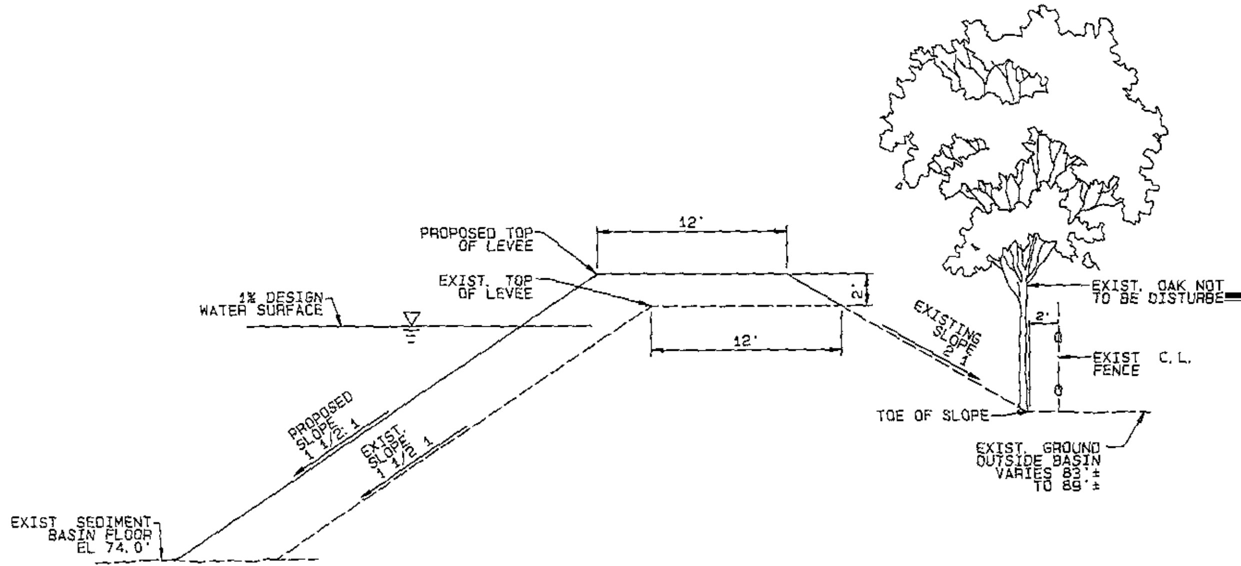
SECTION C/23 OGEE CREST AND SIDE CHANNEL

N T S.


PROPOSED TOP OF LEVEE EL. 92 0'
PROPOSED OVERFLOW SPILLWAY (CREST EL 88. 9')
EXIST TOP OF LEVEE EL 90. 0'
EXIST SPILLWAY CREST EL 87 0'
PROPOSED 6'C.L FENCE
37'
2'±
PROPOSED 6' C L FENCE
EXIST. GROUND
EXIST TRAP CHANNEL TO BE REMOVED
PROPOSED IMPACT BLOCK
15'±
60"
PROPOSED SAFETY AND ACCESS LADDER AT BOTH SIDES OF STILLING BASIN
s=0.1%
s=1%
PROPOSED SIDE CHANNEL FOR OVERFLOW SPILLWAY
5" WEEPHOLES ON IMPACT BLOCK
6'
PROPOSED LOW FLOW OUTLET PIPE TO MATCH STILLING BASIN FLOOR ELEVATION

SECTION A/23

N T S



SECTION D/23

N. T. S.

REV	DESCRIPTION	DATE	APPR
	REDUCED PLAN USE SCALE BELOW 1 2 3		

REFERENCE INFORMATION AND NOTES

1. SEE SHEET 20 FOR GENERAL PLAN OF THIS AREA.
2. OUTLET PIPE CAPACITY NOT TO EXCEED 180 CFS AT DESIGN POOL ELEVATION OF 89 0'.
3. REFER TO ENGINEER'S REPORT APPENDIX J FOR HYDRAULIC DESIGN OBJECTIVES.
4. SPILLWAY AND STILLING BASIN DIMENSIONS SUBJECT TO CONFIRMATION OF HYDRAULIC MODEL STUDY.
5. LOW FLOW OUTLET PIPE TO HAVE SLOTTED INTAKES BELOW SEDIMENT BASIN FLOOR ELEVATION FOR DEWATERING BASIN

DATE 2-1-88
DESIGN KWW/KEM
DRAWN BT/SW
CHECKED KWW

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
Keith Whitman
PROJECT ENGINEER R.C.E. NO. 35663
Randy Talley
DIVISION ENGINEER R.C.E. NO 25093

ENGINEERING APPROVAL
HEAD, PROJECT DEVELOPMENT BRANCH R.C.E. NO 2047

MATADERO CREEK
BARRON SEDIMENT BASIN DETAIL
FLOOD BASIN TO FOOTHILL EXPWY

SCAL
AS SH
SHE
2